

# **MicroVAX 2000 Operation Addendum: VAXserver 2000**

Order Number EK-199AA-AD-002

This addendum supplements the information in your MicroVAX 2000 Hardware Information kit. This addendum describes the differences between the MicroVAX 2000 and the VAXserver 2000. If you purchased the VAXserver 2000 system, add this addendum to your Hardware Information binder.

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November, 1988

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## Introduction

Unlike the MicroVAX 2000 system, which is a general purpose, multiuser application system, VAXserver 2000 system is a dedicated system allowing only two login processes at a time.

VAXserver 2000 systems differ from time-sharing (MicroVAX 2000) systems in that they are designed to provide one or more specific services or functions as efficiently as possible. The user of these services has no direct interface with the VAXserver operating system and cannot directly control access to create, modify or delete their private data. Generally, VAXserver systems are systems that:

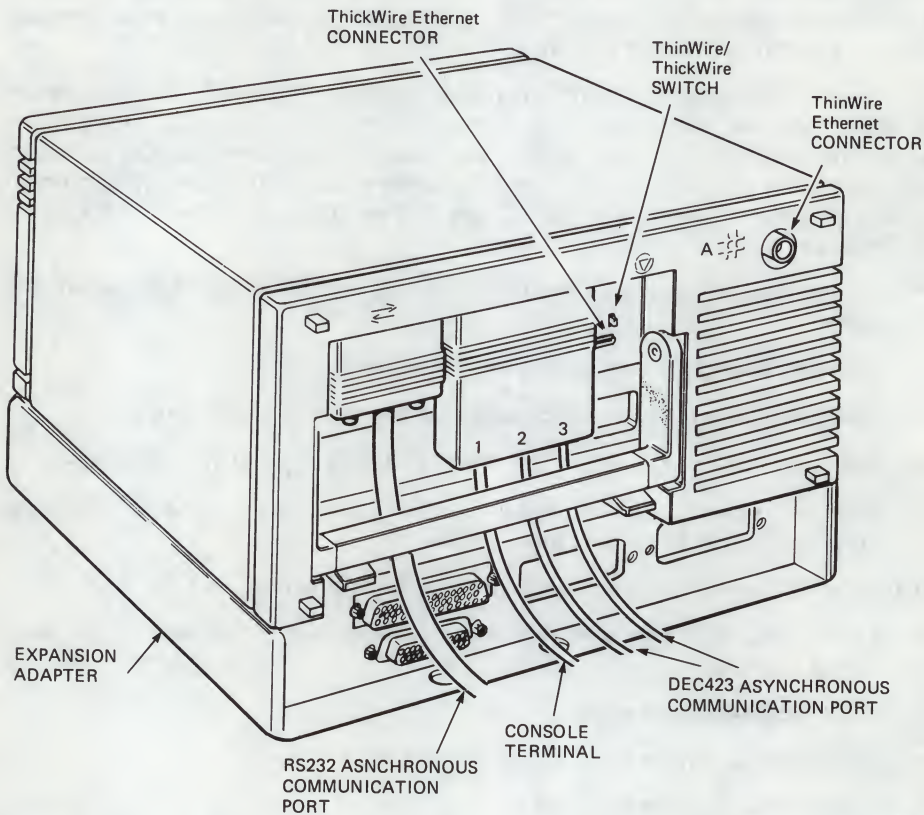
- are used to relieve the host time-sharing system from time-consuming tasks
- are used as a public resource for time-sharing systems
- provide background or batch services for time-sharing systems
- provide start-up, file and print services for groups of workstations
- provide specific functionality rather than the general purpose functionality of time-sharing systems

A typical VAXserver system may include the following:

- VAX/VMS operating system license (single user or file and application server license)
- Four megabytes memory
- Disk/diskette drives
- Warranty and other licenses

Options for the VAXserver are the same as for the MicroVAX 2000 system which can include the RD53/RD54 disk drive and DESVA (Ethernet interface).

The following figure is a typical cable connection for a VAXserver system.



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## Setting Up and Handling the VAXserver 2000

Use *MicroVAX 2000 Installation* (EK-MVXAB-IG) to set up and test your system when you first receive it and any time you move the system from one location to another.

Graphic symbols, called icons, are molded into the back of the system unit enclosure. These identify the locations of connectors and controls.

The numbers 1, 2, and 3 are molded onto the converter that is attached to the rear of the system unit. These numbers identify the converter's connectors. The converter provides DEC423 communications protocol.

## Controls and Indicators

Refer to the *MicroVAX 2000 Operation* (EK-MVXAA-OP).

## Powering Up the System

Powering up a VAXserver 2000 system is the same as for a MicroVAX 2000. However, the power-up display for the VAXserver is different. The following is a sample of a power-up display for the VAXserver 2000.

```
KA410-B V2.2
```

```
F...E...D...C...B...A...9...8...7...6...5...4...3...2...1...
```

```
83 BOOT SYS
```

```
-DUA2
```

```
-DUA0
```

### CAUTION

Do not power down the VAXserver 2000 until power-up testing is complete. Wait until you see the console prompt >>> or the first screen of your operating system software before powering down. After you power down the system, wait at least 10 seconds before you power up the system again.

The following table lists the system's normal power-up indications. The table includes indicators on optional equipment as well. Your system may not contain all of the listed devices.

**Table 1 Normal Power-Up Indicators**

Indicator	Normal Indication
Diskette drive light on system unit	Glows red
Tape drive load/unload button on expansion box	Glows red for approximately 4 seconds and then goes out

Refer to *MicroVAX 2000 Operation* for more information regarding system power-up.

For more information on the operation and installation of your VAXserver 2000 system, refer to *MicroVAX 2000 Operation* (EK-MVXAA-OP) and *MicroVAX 2000 Installation* (EK-MVXAB-IG).

If you are unable to solve any problem with the VAXserver 2000, call your service representative. Be prepared to give your representative the results of any tests you may have run.









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# **MicroVAX 2000 Operation**

Order Number EK-MVXAA-OP-001

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DECwriter	P/OS	VAXstation II
DIBOL	Print Server 40	VAXstation II/GPX
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## About This Guide

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This guide describes how to operate the MicroVAX 2000 hardware. You should install your system by following the directions in *MicroVAX 2000 Installation*.

This guide has two chapters, an appendix, and a glossary.

**Chapter 1, Operating the MicroVAX 2000**, describes system operating procedures.

**Chapter 2, Options for the MicroVAX 2000** describes the options available for the MicroVAX 2000.

**Appendix A, Related Documentation** lists related documentation available for the MicroVAX 2000 and its options.

The **Glossary** defines key terms.

Convention	Meaning
Note	Provides general information you should be aware of.
PN	Indicates a part number.
> > >	Indicates a console prompt.
<b>Bold text</b>	Bold print identifies user input
<b>Ctrl</b> <b>C</b>	For sequences that use the <b>Ctrl</b> key, hold down <b>Ctrl</b> and press the second key.
<code>VSmv_Res_Succ</code>	Examples of commands or other text you enter on the keyboard are shown in monospace type.



### MicroVAX 2000 Description

The MicroVAX 2000 is a multiuser desktop computer that uses the MicroVAX II processor chip with 2 megabytes (Mbytes) of memory on-board. The desktop enclosure holds one or two mass storage devices. The base system allows up to four terminals or serial lines to be connected.

The following Digital hardware options are offered:

- A 4-Mbyte memory module and a 12-Mbyte memory module
- Expansion boxes for additional mass storage devices
- Mass storage
  - Diskette drive with 1.2 Mbytes of memory
  - Half-height fixed-disk drives with 41.8 Mbytes of memory
  - Full-height fixed-disk drives with 69.6 or 155 Mbytes of memory
  - Tape drive with 94.5 Mbytes of memory
- Ethernet controller module
- Communication options
  - DST32 synchronous serial line option
  - DHT32 asynchronous serial line option
  - DSH32 synchronous/asynchronous serial line option
- Printers
  - LN03, LN03 Plus, ScriptPrinter and LPS40 laser printers
  - LA210, LA100, LA75, and LA50 dot matrix printers
- Terminals
  - LA100 and LA120 hardcopy terminals
  - VT220, VT240, and VT241 video terminals
  - VT320, VT330, and VT340 video terminals
- Modems
  - DF112, DF124, and DF224 modems

MicroVAX 2000 software includes the following:

- VAX/VMS operating system software
- Ultrix-32 operating system software

# Operating the MicroVAX 2000

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This chapter describes how to operate the MicroVAX 2000 and its mass storage devices. Review this chapter before installing operating system software. Descriptions and operating information are included for the following:

- Enclosure
- Controls and indicators
- Fixed-disk drives
- Diskette drive and diskettes
- Tape drive and tape cartridges
- Expansion box

## 1.1 Setting Up and Handling the MicroVAX 2000

Use *MicroVAX 2000 Installation* to set up and test your system when you first receive it and any time you move the system from one location to another. *MicroVAX 2000 Installation* describes setting up each box either on its bottom or on its side. This guide describes and illustrates each box bottom-side-down only; system operation is the same for either orientation.

Graphic symbols, called icons, are molded into the back of the system unit enclosure. These identify the locations of connectors and controls.

The numbers 1, 2, and 3 are molded onto the converter that is attached to the rear of the system unit. These numbers identify the converter's connectors. The converter changes RS232 communications levels to DEC423 levels.

On the back of the system unit (Figure 1-3) and each expansion box is a cable-restraining bar that relieves strain on the cables installed in the rear of that box. This bar may be used as a handle when carrying the system unit or expansion boxes.



### **CAUTION**

**Do not set the MicroVAX 2000 system unit or expansion boxes on their fronts. This may cause damage to the drive doors on the front of the boxes.**

**Be sure to turn off the MicroVAX 2000 before lifting or moving it. Dropping or jarring the system unit or an expansion box can cause damage to a fixed-disk drive, and loss of data stored on that disk. This is especially true when power is applied to the system and the drive is active.**

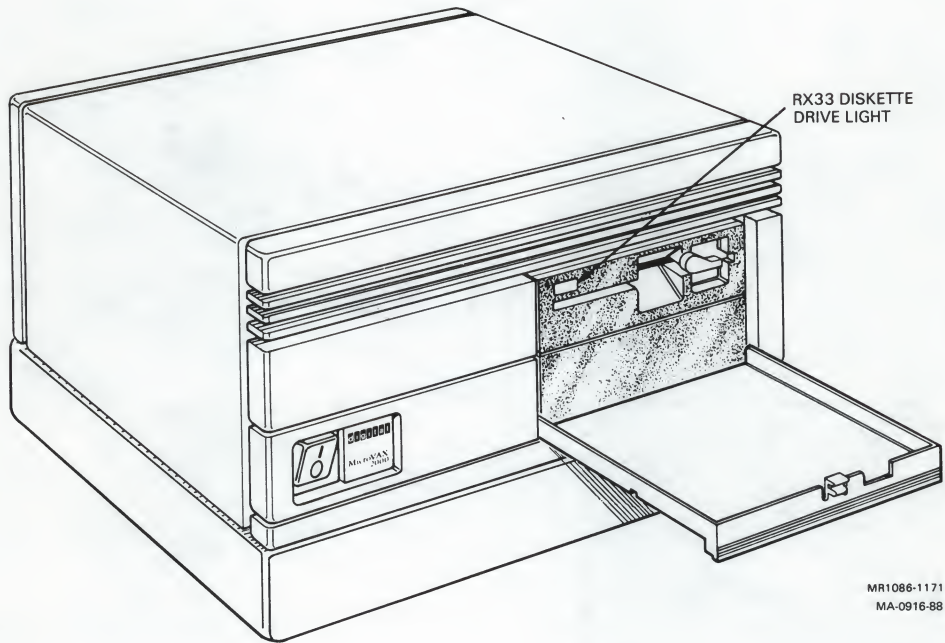
## **1.2 Controls and Indicators**

The MicroVAX 2000 system unit contains the following controls and indicators (Figure 1-1 through Figure 1-3 and Table 1-1):

- System on/off switch
- Halt button

In addition, the system unit and optional expansion boxes may contain the following controls and indicators:

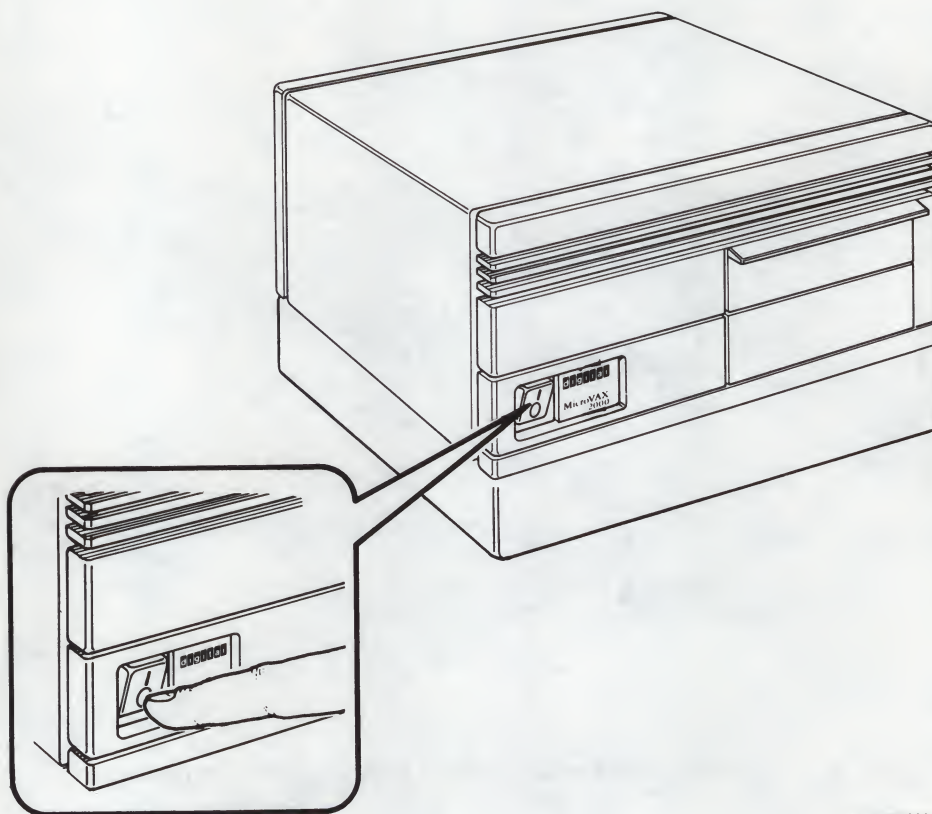
- Red light on RX33 diskette drive
- Load/unload pushbutton with integral red light on TK50 tape drive
- Green light on TK50 tape drive



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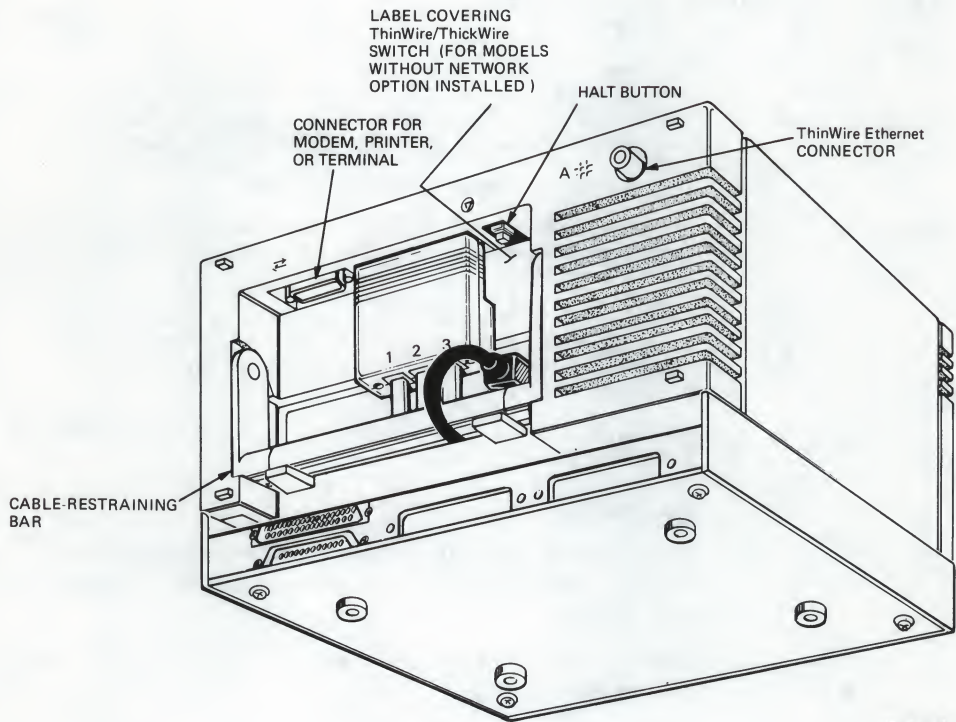
**Figure 1-1 System Unit On/Off Switch and Diskette Drive Light**

#### 4 Operating the MicroVAX 2000



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MA-0895-88

**Figure 1-2 Setting On/Off Switch to O**



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MA-0898-88

**Figure 1-3 Halt Button—Rear of System Unit**



**Table 1-1 Controls and Indicators**

<b>Control or Indicator</b>	<b>Function</b>
System on/off switch	Controls ac power. Setting this rocker switch to O (Figure 1-2) turns off system power. Setting the switch to 1 turns on the power.  The expansion box has its own on/off switch.
Halt button	Stops the normal operation of any software and puts the system in console mode. See Figure 1-3. The halt button is a momentary-contact pushbutton.  Console mode allows the user to control certain functions of the system that are usually controlled by operating system software. When the MicroVAX 2000 is in console mode, the user types commands at the console prompt >>>.  The halt button and console commands are discussed further in this manual.  <b>NOTES</b> <b>Pressing the halt button may cause unsaved data to be lost. See your software documentation for more information.</b> <b>Always warn other system users before you press the halt button.</b>
Diskette drive light	Glow red when the drive is active.
Tape drive pushbutton with integral red light	This load/unload button controls the loading and unloading of tape cartridges. This button is described in detail later in this chapter.
Tape drive green light	Glow steadily to indicate either that the tape drive is ready for use or that the tape has been successfully loaded. This light is described in detail later in this chapter.

### 1.3 Terminal Controls and Indicators

Refer to your terminal installing and using guide for information on using the controls and indicators on the terminal. This document is shipped with each terminal.



## 1.4 Powering Up The System

Before powering up the system, install it according to the instructions in the *MicroVAX 2000 Installation*.

If operating system software has not been installed in the MicroVAX 2000, use the documentation that came with your software to complete the installation.

1. Set the console terminal on/off switch to on (1).

The console terminal is the terminal that is installed in connector 1 on the rear of the system unit.

2. Power up any expansion boxes and peripheral equipment such as the printer.
3. Set the system unit on/off switch to on (1).

After about 10 seconds, the console terminal displays the power-up test sequence.

### CAUTION

Do not power down the MicroVAX 2000 until power-up testing is complete. Wait until you see the console prompt >>> or the first screen of your operating system software before powering down. After you turn the system off, wait at least 10 seconds before you turn the system on again.

### NOTE

Important messages are displayed during power-up. Read the rest of this section for information on the screen display.

Figure 1-4 shows a sample power-up display.

Table 1-2 lists the system's normal power-up indications. The table includes indicators on optional equipment as well. Your system may not contain all of the listed devices.

**Table 1-2 Normal Power-up Indications**

Indicator	Normal indication
Console terminal power indicator	Glows green
Diskette drive light on system unit	Glows red
Tape drive load/unload button on expansion box	Glows red for approximately 4 seconds and then goes out

## 8 Operating the MicroVAX 2000

The fan in the system box goes on at power-up. You may be able to hear it if the room is quiet. The fan exhausts air through the vents on the rear of the system unit.

If you do not observe the normal indications listed in Table 1-2, refer to Chapter 2.

```
KA410-A V2.2
```

```
F...E...D...C...B...A...9...8...7...6...5...4...3...2...1...
```

```
83 BOOT SYS
```

```
-DUA2
```

```
-DUA0
```

### Figure 1-4 Sample Power-Up Display

The power-up test sequence is displayed on the console terminal each time the MicroVAX 2000 is powered up. The display consists of a countdown from the letter F to the number 1. Then the device names of one or more mass storage devices (if present) are shown (DUA2 and DUA0, for example, Figure 1-4). The last item on the list identifies the MicroVAX 2000 mass storage device that contains bootable software. If the last line on the list is MUA0, the system is booting from the tape drive. If the last line of the display is ESA0, the MicroVAX 2000 is searching for bootable software over the Ethernet network.

If the system cannot locate any bootable software, one of two things happens. An error message may be displayed:

```
FATAL ERROR ROUTINE CALLED FROM PC = 0000072E  
ERROR CODE = 000008C2  
84 FAIL  
>>>
```

Or, if your system is connected to the Ethernet network, the system may continue to search the network for bootable software. In this case the console terminal displays the following message:

```
?54 RETRY
```

and no console prompt >>> is displayed. If this happens, press the halt button located at the back of your system. The console prompt >>> is then displayed. Type **BOOT** at the console prompt >>>, or **BOOT** followed by the name of the device that contains operating system software, and press

**Return**.

An underscore following a number in the countdown sequence indicates that the corresponding optional hardware has not been included in your system.

#### NOTE

If any number in the countdown sequence has a question mark or an asterisk beside it, as shown in Figure 1-5, there may be a fault in the system. See Chapter 2 for more information.

```
KA410-A V2.2
F...E...D...C...B...A...9...8...7?...6...5...4...3...2...1...
?? 7 0090 1120.0020
```

**Figure 1-5 Sample Power-Up Display With Error Messages**

When the first screen display for the operating system software appears, the system and all terminals are ready for use. Refer to the software documentation for instructions on using the MicroVAX 2000 software.

See Appendix A for a list of related documents.

## 1.5 Powering Down the System

To save data and ensure an orderly system shutdown, follow the shutdown procedure described in your operating system software documentation. After completing an orderly system shutdown, turn off the system in the following order:

1. Console terminal
2. Other peripheral equipment such as printer or modem
3. Expansion boxes
4. MicroVAX 2000 system unit

#### CAUTION

After powering off the system, be sure you wait at least 10 seconds before powering on the system again.



## 1.6 Fixed-Disk and Diskette Drives for the System Unit

When you lower the drive door on the front of the MicroVAX 2000 system unit, you find one of the following three configurations:

1. An RX33 diskette drive (Figure 1-6) with a lever and slot in the upper portion of the opening and a blank metal plate in the lower portion.

The RX33 diskette drive uses double-sided, high-density removable RX33K diskettes. Up to 1.2 Mbytes of data can be stored on each RX33K diskette (0.6 each side). The RX33 diskette drive also uses single-sided normal-density RX50K diskettes. Up to 0.4 Mbytes of data can be stored on each RX50K diskette. The RX33 is a half-height (approximately 1-5/8 inches high) device.

The blank metal plate may cover an RD32 fixed-disk drive. The metal plate covers the empty cavity if no disk drive is present. The RD32 is a half-height device and stores up to 41 Mbytes of formatted data on a nonremovable disk.

2. An RD54 fixed-disk drive

The RD54 fixed-disk stores up to 155 Mbytes of formatted data. The disk is sealed in place. You cannot remove the disk. The RD54 can be used in the system unit or in the expansion box. The drive is a full-height (approximately 3-1/4 inches high) device.

3. Two blank metal plates covering the opening (Figure 1-7). The plates cover one of two possible configurations:

- An RD53 fixed-disk drive

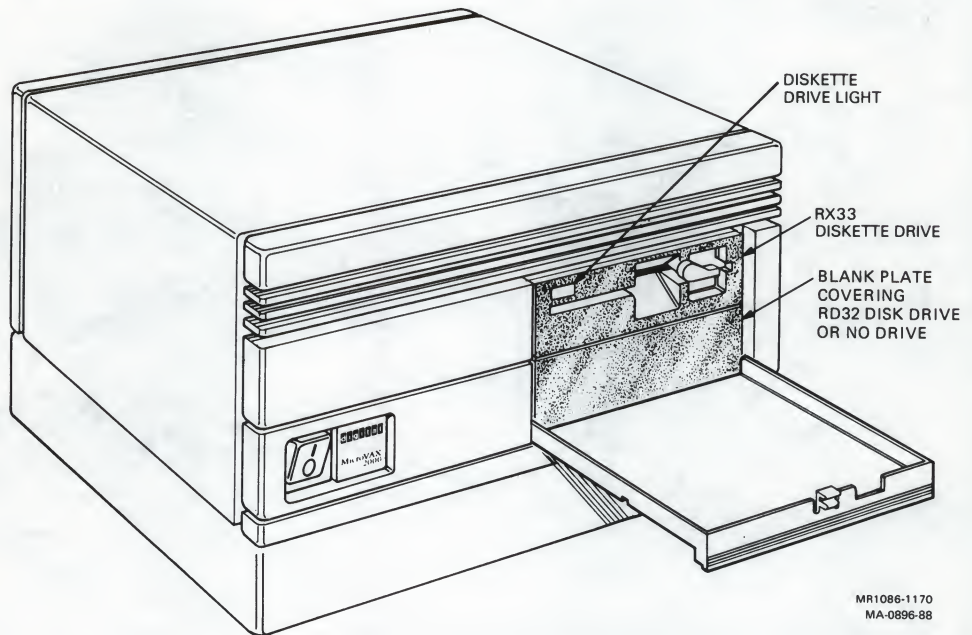
The RD53 fixed-disk stores up to 71 Mbytes of data. The disk is sealed in place. You cannot remove the disk. The RD53 can be used in the system unit or in the expansion box. The drive is a full-height (approximately 3-1/4 inches high) device.

- No fixed-disk drive

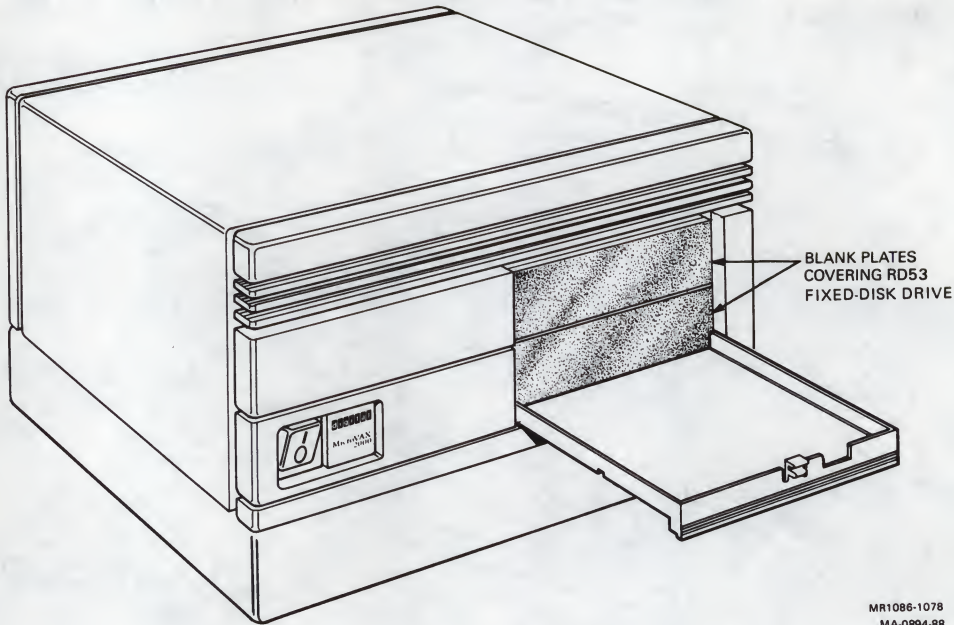
If your MicroVAX 2000 is part of a cluster (a group of computers networked together), you can use devices that reside on other systems to store your software and data. See your software documentation and the *VAXstation 2000*, *MicroVAX 2000* and *VAXmate Network Guide* for more information.



To find the model numbers of the fixed-disk drives in your system, see The Fixed-Disk Verifier in Chapter 2.



**Figure 1-6 Configuration with RX33 Diskette Drive and RD32 Fixed-Disk Drive (or No Drive)**

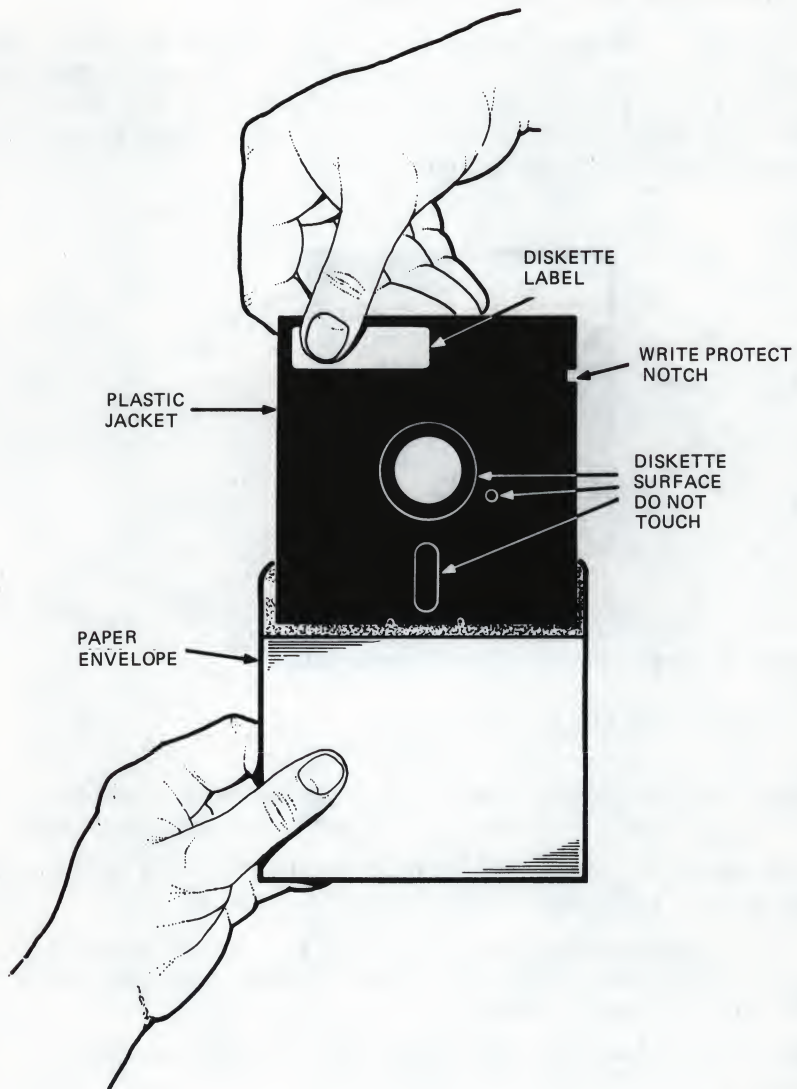


**Figure 1-7 Configuration with Blank Plates**

### **1.6.1 Diskettes**

The RX33 diskette drive magnetically stores data on removable diskettes. Each RX33K diskette (Figure 1-8) is permanently enclosed inside a gray plastic jacket. When a diskette is inserted into the diskette drive and the drive is active, the diskette spins inside the jacket. The read/write head of the diskette drive contacts the diskette through the openings in the jacket. The fabric lining of the jacket continuously cleans the diskette. Do not attempt to remove the diskette from its jacket.

The RX33 diskette drive accepts RX50K diskettes as well as RX33K diskettes. An RX50K diskette can be distinguished from an RX33K diskette by its black plastic jacket with a printed orange arrow. RX50K diskettes are preformatted.



MR-13466A  
MA-1099-88

**Figure 1-8 RX33K Diskette**



## 1.6.2 Write-Protecting Diskettes

Both RX33K and RX50K diskettes have a write-protect feature to prevent accidental overwriting. To protect data, cover the write-protect notch on the side of the plastic jacket with one of the adhesive foil tabs supplied with your diskettes (Figure 1-9). Remove the tab when you want to add, change, or delete information on the diskette.



MR-13477  
MA-1103-88

**Figure 1-9 The Diskette Write-Protect Tab**

## 1.6.3 Inserting Diskettes

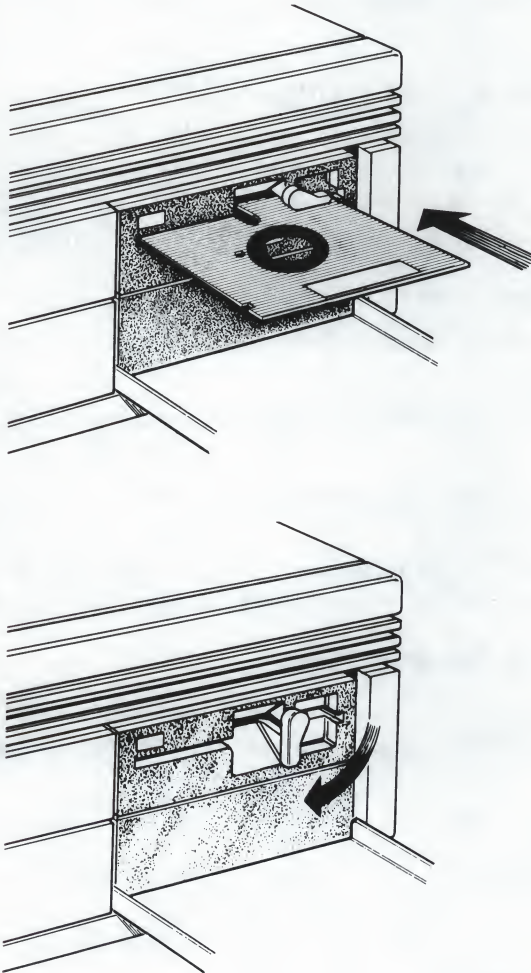
1. Open the door on the front panel of the MicroVAX 2000 system unit. Inside is a lever that allows you to insert and to remove a diskette.
2. Make sure that the diskette drive is not active by verifying that the light on the front of the drive is not lit.
3. If the lever on the front of the drive is in a vertical position, move it counterclockwise to a horizontal position (Figure 1-10) and remove the diskette that is in the drive.
4. Remove the diskette to be inserted from its paper envelope. Hold the diskette so that the write-protect notch is to your left and the diskette's label is up.
5. Push the diskette into the slot until it snaps into place.



6. Move the lever clockwise to its vertical position.

**NOTE**

Do not force the lever. Make sure that the diskette is fully inserted. The diskette drive lever must be in a vertical position for the drive to function.



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MA-1104-88

**Figure 1-10 Inserting Diskettes**

### 1.6.4 Removing Diskettes

Before removing a diskette, check the light on the front of the drive. If the light glows red, the drive is active. Do not attempt to remove a diskette when the drive is active or the diskette may be damaged. Once the light is off, move the lever to the horizontal position and remove the diskette.

**NOTE:** During software installation, the light may remain lit when the drive is not active. Follow the instructions in your software documentation in this case.

### 1.6.5 Handling and Storing Diskettes

Incorrect handling and storing of diskettes can damage them and cause loss of data. In turn, damaged diskettes can damage the diskette drive. The following precautions should be taken:

- Keep diskettes in their paper envelopes when not in use.
- Do not fold or bend diskettes.
- Do not touch the surface of diskettes. Handle only the top (label area) of diskettes.
- Store diskettes vertically. To prevent warping, avoid packing diskettes tightly.
- Use only a felt-tip pen when labeling diskettes. The pressure of a sharp instrument such as a pencil or pen can damage diskette surfaces.
- Store diskettes away from heat and magnetic fields (such as those produced by motors, transformers, and video terminals and monitors).

### 1.6.6 Making Backup Copies

Use the diskette drive to make backup copies of files that you normally store on a fixed-disk. Refer to your software documentation for instructions.

### 1.6.7 Formatting RX33K Diskettes

You must format each RX33K diskette before using it for the first time. Formatting prepares the diskette to accept data. The process consists of inserting the diskette in the drive and typing commands at the console terminal. Formatting a diskette takes about 2 minutes.

**NOTE:** RX50K diskettes are preformatted and do not require any preparation for use. Formatting an RX33K diskette that has already been formatted destroys data that may be stored on that diskette.

See the *VAXstation 2000/MicroVAX 2000 Operations Guide* for formatting procedures for systems containing MicroVMS operating system software.

1. Check your software documentation for shutdown instructions before you halt the system.
2. Put the system into console mode by pressing the halt button on the rear of the system.
3. Remove the diskette that you intend to format from its paper envelope.
4. Be sure that the diskette is not write-protected. (See Write-Protecting Diskettes in this chapter.)
5. With the diskette's label up and the write-protect notch to your left, insert the diskette until it snaps into place. Move the lever clockwise to its vertical position.

#### NOTE

Do not force the lever. The diskette must be fully inserted in the drive for the lever to move freely.

6. Put the system into console mode by pressing the halt button on the rear of the system unit.
7. Type TEST 70 and press **Return** at the console prompt >>> on the console terminal. The following text appears on the console terminal screen:

```
KA410-A RDRXfmt
VSfmt_QUE_unitno (0-2) ?
```

8. Type 2 and press **Return**.

#### CAUTION

Type only the 2. Typing 0 or 1 starts up the fixed-disk formatter, which may result in loss of software and data on the fixed-disk.



## 18 Operating the MicroVAX 2000

If the following text appears, you must start over with the TEST 70 command at the console prompt:

```
VSfmt_RES_ERR #1
84 FAIL
>>>
```

If you continue to get the error message, see *MicroVAX 2000 Troubleshooting* for information on isolating and solving problems.

The following text appears if there are no errors:

```
VSfmt_QUE_RXmedtyp
(1=RX33) ?
```

9. Type 1 and press **Return**. Any other number causes the following text to be displayed:

```
VSfmt_RES_Err #6
84 FAIL
>>>
```

This message is also displayed if you have mistakenly inserted an RX50K diskette, which is preformatted and should not be formatted in the MicroVAX 2000. The message also indicates that no diskette was inserted in the drive, or that the drive lever was not moved to the vertical position.

Start over with the TEST 70 command at the console prompt after this error.

The following text appears next if no errors exist:

```
VSfmt_QUE_RUsure (DUA2 1/0) ?
```

10. Type 1 and press **Return** to continue. The following message appears slowly.

```
VSfmt_STS_Fmting .....OK
VSfmt_STS_CkRxfmt .....OK
VSfmt_RES_Succ
>>>
```

The diskette has been successfully formatted and can now be used to store data.



If for any reason you do not want to continue, type 0. If you see any device number other than DUA2 in the text, type 0. When you do this, the following message appears:

```
VSfmt_RES_Abtd
84 FAIL
>>>
```

The formatter has now stopped. You must start at the beginning of the procedure when you are again ready to format a diskette.

If an error occurred during formatting, one of the following messages appears:

```
VSfmt_RES_ERR #3
84 FAIL
>>>
```

or

```
VS_RES_ERR #5
84 FAIL
>>>
```

Try formatting the diskette again. If that is unsuccessful, try another diskette. If you continue to see either error message, see *MicroVAX 2000 Troubleshooting* to isolate and solve the problem.

### 1.6.8 Formatting Fixed-Disks

Before data can be stored on a fixed-disk, the disk must be formatted. Formatting prepares the disk to accept data.

Formatting the fixed-disk is part of the hardware installation process, as explained in the *MicroVAX 2000 Hardware Installation Guide*. However, it may be necessary to reformat the disk after repair, replacement or corruption of the data stored on that disk. If you want to determine whether your disk is already formatted, see The Fixed Disk Verifier in *MicroVAX 2000 Troubleshooting*.

#### CAUTION

Reformatting a disk destroys stored software and data. Back up your disk before reformatting.

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To format your fixed disk, follow these steps.

1. Type **TEST 70** and press **Return** at the console prompt **>>>**. The following text appears on the console terminal screen:

```
KA410-A RDRXfmt
VSfmt_QUE_unitno (0-2) ?
```

2. Type **0** for a fixed-disk drive in the system unit. Type **1** for a fixed-disk drive in the expansion box.

If everything is working normally, the following text appears:

```
VSfmt_STS_Siz
```

If you type an invalid number, the following text appears:

```
VSfmt_RES_ERR #1
```

If this happens, start over at the first step. If you continue to see the error message, turn to *MicroVAX 2000 Troubleshooting* for information on isolating and solving problems.

If no error occurs, you see the following sample text as the formatter program determines the type of fixed-disk drive you have selected for formatting:

```
VSfmt_STS_Siz ..... RD32
```

In this case, the formatter has identified the disk drive as an RD32.

If you see the following error message

```
VSfmt_STS_Siz .....??
VSfmt_RES_Err # 2
84 FAIL
>>>
```

the fixed-disk drive or its controller may be faulty. See *MicroVAX 2000 Troubleshooting* to troubleshoot the problem.

If no problem occurs with the drive, the following appears:

```
VSfmt_QUE_SerNbr (0-999999999) ?
```

3. Refer to the packing slip that came with your system shipment for the serial number of the fixed-disk drive you are formatting. Type only the numbers and Press **Return**.

If you cannot locate the serial number, assign a number of your choice to the drive. Be sure to record this number for later reference. Assign a different number to each drive you format.

The following is a sample of the text that appears:

```
VSfmt_QUE_RUsure (DUA0 1/0)?
```

Type 1 and press **Return** to continue. If for any reason you do not want to continue, type 0. If you do this, the following text appears:

```
VSfmt_RES_Abtd
84 FAIL
>>>
```

The formatter has now stopped. You must start at the first step when you are again ready to format a drive.

If you choose to continue, the following message appears gradually. An RD32 takes approximately 15 minutes to format. An RD53 takes approximately 25 minutes to format, and an RD54 takes approximately 40 minutes to format.

```
VSfmt_STS_RdMbb .....OK
VSfmt_STS_Fmtting.....OK
VSfmt_STS_CHKpss.....OK
VSfmt_STS_BBRvec := x
VSfmt_RES_Succ
>>>
```

If you see this message in its entirety, the disk has been successfully formatted and is ready for use.



If a problem occurs, one of the following two messages appears:

```
VSfmt_STS_Fmtng.....??  
VSfmt_RES_ERR #3  
84 FAIL  
>>>
```

or

```
VSfmt_STS_CHKpss 1.....??  
VS_RES_ERR #4  
84 FAIL  
>>>
```

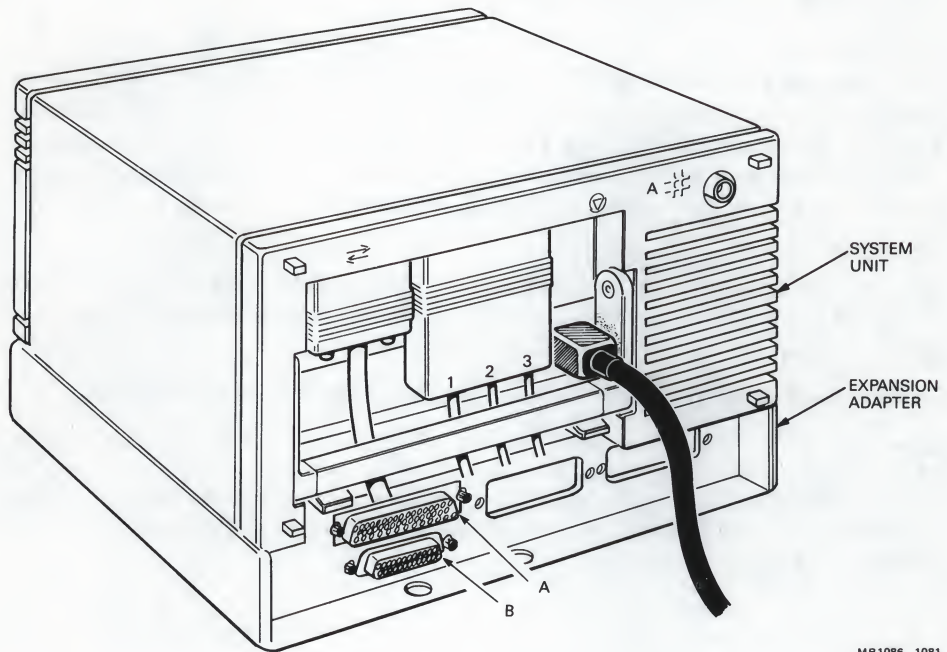
If you see either of these messages, refer to *MicroVAX 2000 Troubleshooting* for information on isolating and solving problems.

## 1.7 The Expansion Adapter

The expansion adapter (Figure 1-11) is an attachment for the MicroVAX 2000 system unit and permits communication between the expansion box (Figure 1-12 and Figure 1-13) and the system unit.

The expansion adapter contains two connectors: A and B. These letters are stamped on the expansion adapter to identify the connectors. A is the connector for an expansion box containing a tape drive. B is the connector for an expansion box containing a fixed-disk drive. A third and fourth opening are covered by a metal plate unless you order one of the communications options.





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MA-0897-88

**Figure 1-11 The Expansion Adapter (Rear)**

## 1.8 The Expansion Box

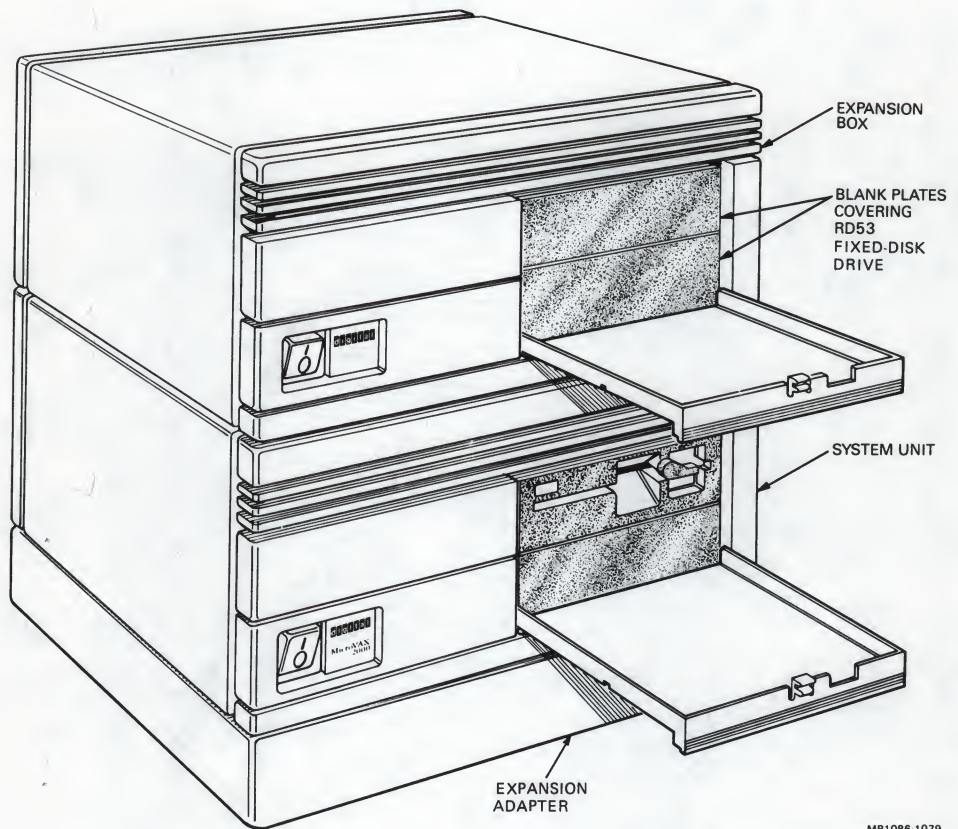
### CAUTION

Only devices such as the RD53-F and RD54-F expansion boxes, which were specifically designed for the MicroVAX 2000 or VAXstation 2000, may be attached to connector B of the expansion adapter. Likewise, devices such as the RD53-F and RD54-F expansion boxes must not be connected to any device for which they were not designed, as circuit damage or data loss may occur.

Expansion boxes provide additional storage for the MicroVAX 2000. A box can hold an RD53 or an RD54 fixed-disk drive or a TK50 tape drive. You may use only one of each type in your system.

Do not stack more than one expansion box on top of the system unit.

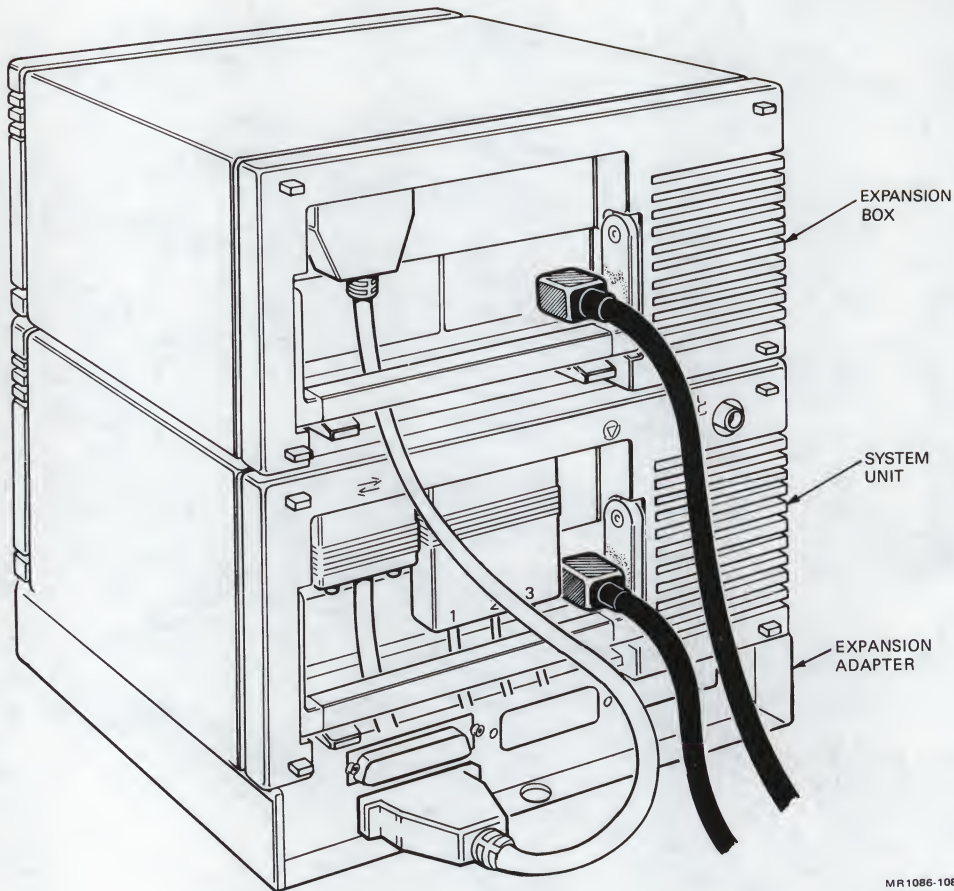
The front of the expansion box has the same on/off switch and drive door as the system unit. An expansion box containing a fixed-disk drive has no visible indicators. An expansion box containing a TK50 tape drive contains two lights. More information about these indicators is supplied later in this chapter.



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**Figure 1-12 Expansion Box (Front)**





**Figure 1-13 The Expansion Box—Rear (Fixed-Disk Drive Cabling Shown)**

## 1.9 The TK50 Tape Drive

The TK50 tape drive (Figure 1-14) holds one removable magnetic tape cartridge. The cartridge stores up to 94.5 Mbytes of data. Use the tape cartridge as an input device to load software or data onto the MicroVAX 2000. Use it as an output device to make copies (or backups) of software or data.

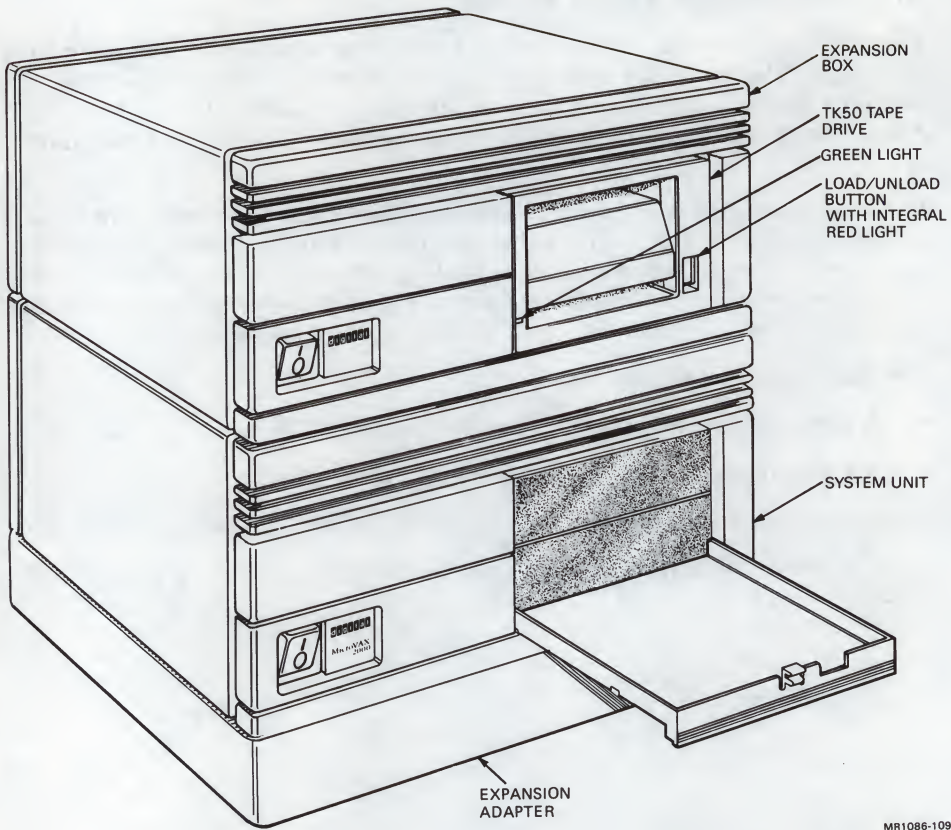
The tape drive has two primary controls: the cartridge release handle and the load/unload button. The cartridge release handle allows cartridges to be inserted and removed and locked into position. The load/unload button controls winding and rewinding of tape. The in position is for loading tape cartridges. The out position is for unloading tape cartridges.

The drive also has two indicators:

- A red light that is integral to the load/unload button
- A green light located on the right side of the drive

These controls and indicators are described in Table 1-3 and Table 1-4.

Refer to the *TK50 User's Guide* for more information on the operation of the TK50.



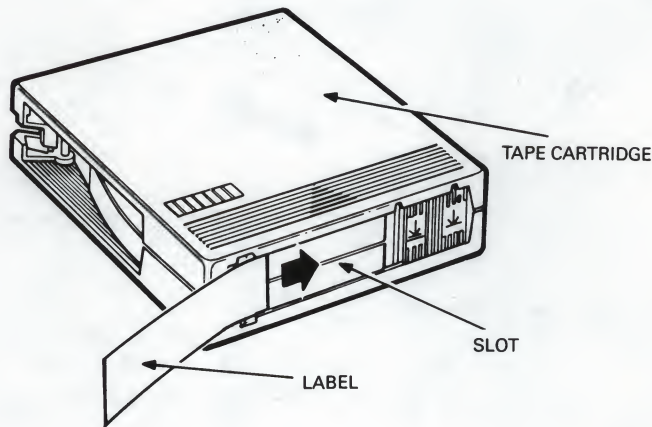
MR1086-1097  
MA-0893-88

**Figure 1-14 Expansion Box with TK50**



### 1.9.1 Labeling a Tape Cartridge

Always label cartridges. There is a slot for the label provided on the front of the cartridge (Figure 1-15). This label is visible when the cartridge is in the drive. Labels or markings on any other part of the cartridge can interfere with proper operation of the drive. Do not write directly on the cartridge with a pen or a pencil.



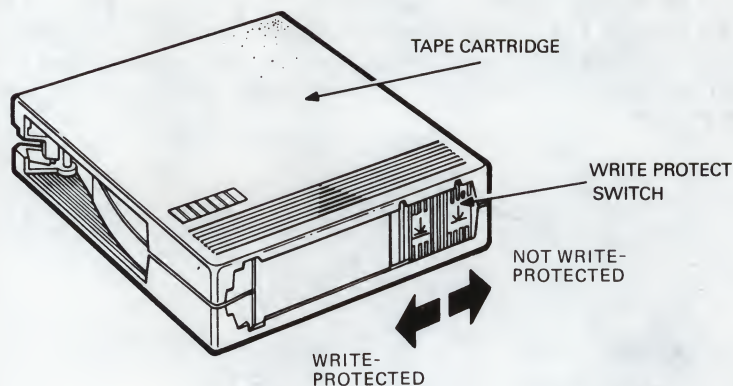
MR-16102A  
MA-1106-88

**Figure 1-15 Labeling**

### 1.9.2 Write-Protecting a Tape Cartridge

Write-protecting a tape cartridge prevents accidental erasure of information. Set the write-protect status with the two-position switch on the cartridge (Figure 1-16). The MicroVAX 2000 can read information on the tape regardless of the position of the write-protect switch. However, the MicroVAX 2000 cannot write data to the tape when it is write-protected.

When you use a cartridge to install software onto the MicroVAX 2000, make sure the write-protect switch on the front of the cartridge is set to write-protect. The switch has two icons indicating the write-protect status. An orange rectangle is also visible when the switch is in the write-protected position. If you do not see an orange rectangle, slide the switch toward the label slot.



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MA-1107-BB

**Figure 1-16 Write-protecting**

**NOTE**

Early versions of the cartridges do not have the orange rectangle. Use the icons as guides.

When you use a cartridge to make a backup copy or to write out data, make sure the write-protect switch is set to enable writing to the tape. To enable writing, slide the switch away from the label slot until it locks into place.

### 1.9.3 Handling and Storing Tape Cartridges

- Do not touch the exposed surface of the tape.
- Do not throw or drop the tape cartridge. The impact can damage the cartridge.
- Allow new tapes to stabilize at room temperature for 24 hours before using them.
- Write on the identification label before putting the label on the tape cartridge. Place the label only in the label slot on the front of the tape cartridge.
- Store tape cartridges away from dust.

- Keep tape cartridges away from direct sunlight, heaters, and other sources of heat. Store tape cartridges at an even temperature between 10 to 40 degrees C (50 and 104 degrees F). Store cartridges where the relative humidity is between 20 and 80 percent.
- Keep tape cartridges away from magnets and types of equipment that generate magnetic fields, such as motors, transformers, and video monitors and terminals.
- Keep tapes away from x-ray equipment.

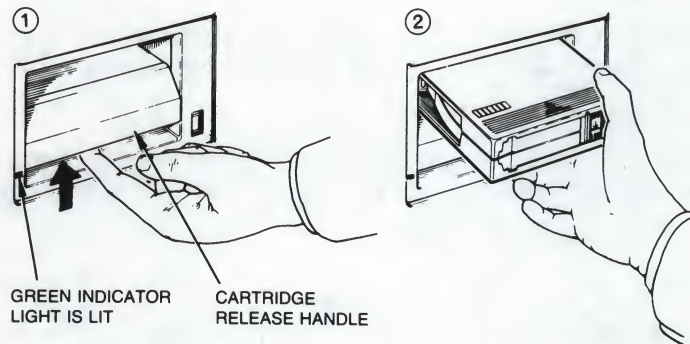
### 1.9.4 Inserting a Tape Cartridge

Make sure the TK50 load/unload button is in the out (unload) position.

The load/unload button glows red for approximately 4 seconds during the tape drive automatic power-up test.

The red light goes off and the green light goes on, indicating that it is safe to move the cartridge release handle.

1. Pull up the cartridge release handle (Figure 1-17).

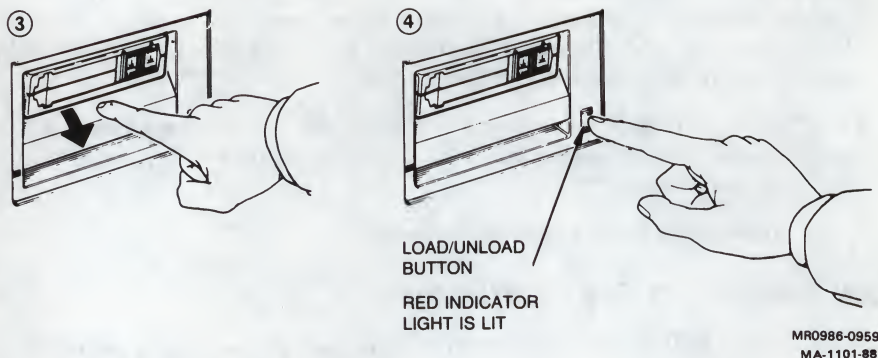


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**Figure 1-17 Lifting Release Handle and Inserting a Cartridge**

2. With the arrow on the cartridge facing up and pointing toward the drive, insert the cartridge into the TK50 drive.  
The red light goes on.  
The green light goes off.
3. Push down the release handle (Figure 1-18).  
The red light goes off.  
The green light goes on.





**Figure 1-18 Pushing Release Handle and Pressing Load/Unload Button**

4. Push the load/unload button to the In (load) position.  
The red light goes on.  
The green light goes off.
5. The tape loads in 10 to 15 seconds. During loading the two leaders couple and the tape winds onto the take-up reel inside the tape drive.  
The red light remains on.  
  
When the green light also goes on, the tape is ready to use. Refer to your software documentation for further instructions.

**NOTE**

If a cartridge is new, the MicroVAX 2000 performs a calibration sequence that takes approximately 40 seconds. The green light flashes rapidly and irregularly during calibration.

**CAUTION**

Never move the cartridge release handle unless the red light is off and the green light is on. Never move the cartridge handle while either light is flashing.

**1.9.5 Removing a Tape Cartridge**

Tape cartridges must be unloaded (rewound and uncoupled) before being removed from the drive. Follow these steps:

1. Ensure that the tape drive is not active. The red light should be off and the green light on.
2. Press the load/unload button to the out (unload) position.

The red and green lights flash slowly as the tape rewinds. This may take up to 90 seconds.

The red light remains on and the green light goes off as the tape unloads into the cartridge.

When the tape is completely unloaded, the red light goes off and the green light goes on.

**NOTE**

Rewinding a tape can also be done under software control. Refer to your software documentation for information.

3. Push the cartridge release handle up.
4. Remove the cartridge.
5. Push the release handle down.

The green light remains on, showing that there is power to the drive and that you can safely move the cartridge release handle.

**CAUTION**

Always remove the tape cartridge from the tape drive when the cartridge is not in use. Remove it before turning off the system. Leaving the cartridge in the drive may result in damage to the cartridge.

### 1.9.6 Summary of TK50 Controls and Lights

Table 1-3 and Table 1-4 summarize the functions and meanings of the TK50 tape drive's controls and indicator lights.

**Table 1-3 TK50 Controls**

Control	Position	Function
Load/unload button	In	Loads the tape (10 to 15 seconds.)
	Out	Rewinds and unloads the tape.
Cartridge release handle	Up	Lets you insert or remove a tape after rewind and unload operations are completed.
	Down	Locks tape in operating position.

**Table 1-4 TK50 Lights**

Green light	Red light	Meaning
Off	Off	No power to the tape drive.
On	Off	Safe to move cartridge release handle. Power is present.
Off	On	Do not move the cartridge release handle. One of the following is in effect: power-up test is occurring, cartridge is inserted but handle is still up, tape is loading or unloading, tape is stopped.
On	On	Tape loaded successfully.
Flashing	On	Tape is in motion (except rewind). Read/write commands are being processed. Irregular fast flashing means tape calibration is occurring.
Flashing slowly	Flashing slowly	Tape is rewinding.
Off	Flashing rapidly	There is a fault. See <i>MicroVAX 2000 Troubleshooting</i> .



# 2

## Options for the MicroVAX 2000

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This chapter describes options that are already installed in your system or that you can add to your system. Installation of expansion boxes, printers, terminals, and modems is described in the *MicroVAX 2000 Installation* and in the documentation that ships with the option. For installation of other options, you must contact your service representative.

Documentation for each option is listed in Appendix A.

To order an option or cables after initial installation of your system, contact your sales representative.

The options currently available for the MicroVAX 2000 fall into the following categories:

- Memory
- Mass storage devices—full-height disk drives, half-height disk drives, tape drive, half-height diskette drive, disk expansion box
- Ethernet module
- Communications modules
- Printers
- Terminals
- Modems

## 2.1 Memory

The MicroVAX 2000 contains two Mbytes of memory on its system module. Optional memory expansion modules allow you to expand to a total of 14 Mbytes of memory. The following describes the additional memory expansion modules:

Order Number	Description
MS400-BA	4-Mbyte memory expansion module
MS400-CA	12-Mbyte memory expansion module

### NOTE

To order the 12-Mbyte memory expansion module, your system must have version 2.2 firmware or higher. The firmware revision level is displayed on your console terminal when you first power up the system.

To order a memory module after the initial system installation, contact your sales representative. For module installation, contact your service representative.

## 2.2 Mass Storage Devices

The following sections describe the mass storage devices.

### 2.2.1 Expansion Box

An expansion box allows for the configuration of additional storage devices in your system. The expansion box contains a power supply, fan, and a cavity that can hold a full-height fixed-disk such as an RD53 drive or an RD54 drive or a TK50 tape drive.

A MicroVAX 2000 system may include a maximum of two expansion boxes: one containing a fixed-disk drive and one containing a tape drive.

The expansion adapter is attached to the MicroVAX 2000 system box and allows for communication between the expansion box and system box.

### CAUTION

Only devices such as the RD53-F and the RD54-F expansion boxes, which were specifically designed for the MicroVAX 2000 or VAXstation 2000, may be attached to connector B of the expansion adapter. Likewise, devices such as the RD53-F and RD54-F expansion boxes must not be connected to any device for which they were not designed, as circuit damage or data loss may occur.

For a description of the expansion box, see Chapter 1. To order an expansion box after initial system installation, contact your sales representative. Contact your service representative to install this option.

### **2.2.2 Fixed-Disk Drives**

A fixed-disk drive stores information on a nonremovable disk. Four fixed-disks are available for the MicroVAX 2000: the full-height RD53, the full-height RD54, and the half-height RD32. Only one fixed-disk drive may be installed in the system unit and only one in the expansion box, for a total of two fixed-disk drives in the system.

For a description of the fixed-disk drives, see Chapter 1. To order a fixed-disk drive after initial system installation, contact your sales representative.

### **2.2.3 RX33 Diskette Drive**

The half-height RX33 diskette drive may be installed in the system unit. It may not be installed in an expansion box. For a description of the half-height RX33 diskette drive, see Chapter 1. The RX33 diskette drive uses RX33K and RX50K diskettes. To order an RX33 diskette drive after initial system installation, contact your sales representative. Contact your service representative to install this option.

### **2.2.4 The TK50 Tape Drive**

The TK50 tape drive is available only in the expansion box. For a description of the TK50 tape drive, see Chapter 1. The TK50 tape drive requires TK50 tape cartridges. To order a TK50 tape drive after initial system installation, contact your sales representative. Contact your service representative to install this option.

## **2.3 The Ethernet Module**

To connect your MicroVAX 2000 to the ThinWire or ThickWire Ethernet, you must have the Ethernet module installed in your system. Contact your sales representative to order this module after initial system installation. You must contact your service representative for module installation.

For more information about networking, see the *VAXstation 2000, MicroVAX 2000 and VAXmate Network Guide*. This guide describes how to configure your system on a network. The guide also lists network options and what to order.

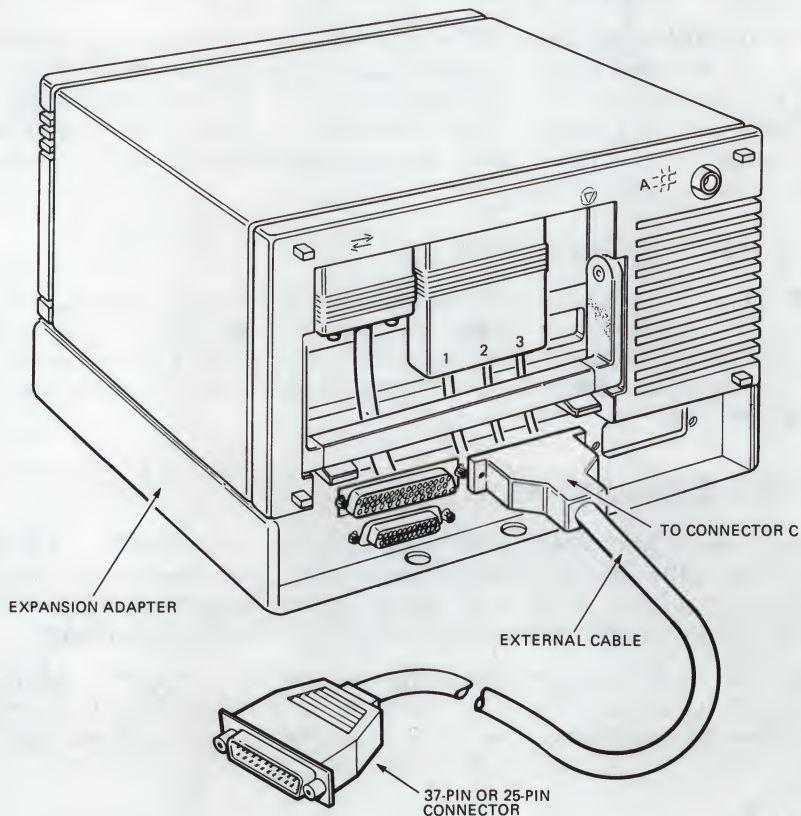


## 2.4 Communication Modules

The following sections describe the DST32 synchronous serial line option, the DHT32 asynchronous serial line option, and the DSH32 synchronous/asynchronous serial line option.

### 2.4.1 DST32 Synchronous Serial Line Option

The DST32 is a communication adapter for the MicroVAX 2000 system. It is nondirect memory access, and provides connection to one synchronous port. The option contains one controller module, internal cabling, and one driver/receiver module with external cabling to connector C on the rear of the expansion adapter. (See Figure 2-1.) In addition, one of three external cabling variations is required for the connection of a host computer or modem to this serial line.



**Figure 2-1 The DST32 Serial Line Option**

The DST32 synchronous device controller supports the following protocols:

- HDLC (LAPB/LABPE)
- SDLC

You can order a new system with this option already installed. If you want this option installed in a system already on your site, a qualified service representative must perform the installation. In either case, the user can make the external cable connections to a host computer or modem. See *MicroVAX 2000 Installation* for information about connecting the external cables to the DST32 Option.

#### 2.4.1.1 Powering up the system with the DST32

To power up the MicroVAX 2000 after installation of the DST32 option, first power up the console terminal (the one connected to connector 1 on the DEC423 converter on the back of the system unit). Then power up all peripheral devices, including all terminals. Finally, power up the system unit.

The console terminal displays the following:

```
KA410-A V2.2
```

```
F_..E...D...C...B...A...9...8...7...6...5...4...3...2...1...
```

```
? C 0080 0000.4001
```

#### NOTE

The question mark and associated letters and numbers are normal power-up indications in the MicroVAX 2000, and do not represent a failure.

Type TEST 50 and press Return at the console prompt >>>. Your console terminal should display text similar to the following, depending on the configuration of your system.

>>> TEST 50

```

KA410-A V2.2
ID 08-00-2B-02-CF-A4
CLK          0000.0001
NVR          0000.0001
? DZ         0000.4001
  00004001 00000001 00000001 00000001 00000000 00000000
MEM          0004.0001
  00400000
MM           0000.0001
FP           0000.0001
IT           0000.0001
HDC          1710.0001
  000146B8 00000000 00000320
TPC          0000.4001
  FFFFFFF03 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05
SYS          0000.0001
DST_32       0000.0001
NI           0000.0001

>>>

```

#### NOTE

The question mark associated with the DZ mnemonic is a normal power-up indication in the MicroVAX 2000, and does not represent a failure.

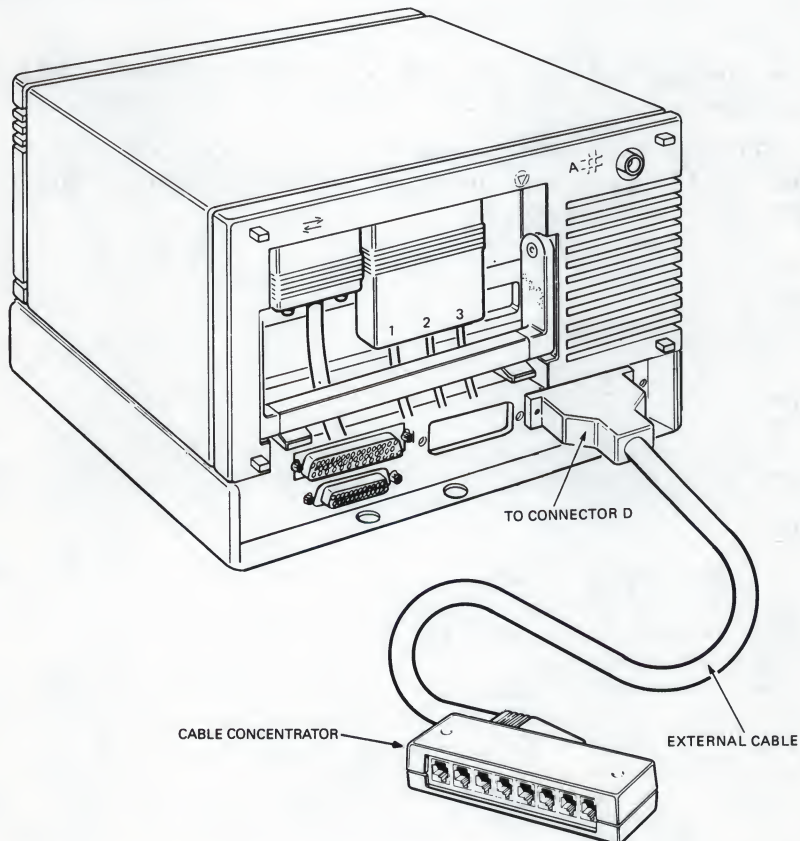
If you see question marks displayed beside the mnemonic DST\_32, the DST32 option is failing the test. See *MicroVAX 2000 Troubleshooting* to diagnose and correct the problem.



### 2.4.2 DHT32 Asynchronous Serial Line Option

The DHT32 serial line option for the MicroVAX 2000 allows up to eight additional terminals or other peripherals to connect to the system, thus allowing up to eight additional users access to the MicroVAX 2000. The option contains one controller module, internal cabling, and one driver/receiver module with external cabling to connector D on the rear of the expansion adapter. (See Figure 2-2.) Connection of one external cable and one cable concentrator on the MicroVAX 2000 enables the connection of additional terminals or other peripherals.

You can order a new system with this option already installed. If you want this option installed in a system already on your site, a qualified service representative must perform the installation of this option. The user can then connect the external cable, cable concentrator, and additional terminals. See *MicroVAX 2000 Installation* for information about connecting the external cables to the DHT32 Option.



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Figure 2-2 The DHT32 Serial Line Option

After installation of the DHT32 option and the cable concentrator, your MicroVAX 2000 can accommodate up to a total of 12 terminals. Up to four of these connect to the rear of the system unit, as explained in *MicroVAX 2000 Installation*. The remaining terminals connect to the cable concentrator.

#### 2.4.2.1 Powering up the system with the DHT32

To power up the MicroVAX 2000, first power up the console terminal (the one connected to connector 1 on the DEC423 converter on the back of the system unit). Then power up all peripheral devices, including the terminals connected to the cable concentrator. Finally, power up the system unit.

The console terminal displays the following:

```
KA410-A V2.2
F...E...D...C...B...A...9...8...7...6...5...4...3...2...1...
? C 0080 0000.4001
```

#### NOTE

The question mark and associated letters and numbers are a normal power-up indication in the MicroVAX 2000, and do not denote a failure.

Type **TEST 50** and press **Return** at the console prompt **>>>**. Your console terminal should display text similar to the following, depending on the configuration of your system.

```
>>> TEST 50

KA410-A V2.2
ID 08-00-2B-02-CF-A4

CLK          0000.0001
NVR          0000.0001
? DZ         0000.4001
  00004001 00000001 00000001 00000001 00000000 00000000
MEM          0004.0001
  00400000
MM           0000.0001
FP           0000.0001
IT           0000.0001
HDC          1710.0001
  000146B8 00000000 00000320
TPC          0000.4001
  FFFFFFF3 FFFFFFF5 FFFFFFF5 FFFFFFF5 FFFFFFF5 FFFFFFF5 FFFFFFF5
SYS          0000.0001
SLU          00FF.0001
NI           0000.0001

>>>
```

**NOTE**

The question mark associated with the DZ mnemonic is a normal power-up indication in the MicroVAX 2000, and does not represent a failure.

If you see a double question mark (??) displayed beside the mnemonic SLU, the DSH32 option is failing the test. See *MicroVAX 2000 Troubleshooting* to diagnose and the problem.

### **2.4.3 DSH32 Synchronous/Asynchronous Serial Line Option**

The DSH32 option is a synchronous/asynchronous serial line option that provides the MicroVAX 2000 system with one connector for synchronous communication and one connector for eight data-only asynchronous lines supporting a variety of protocols.

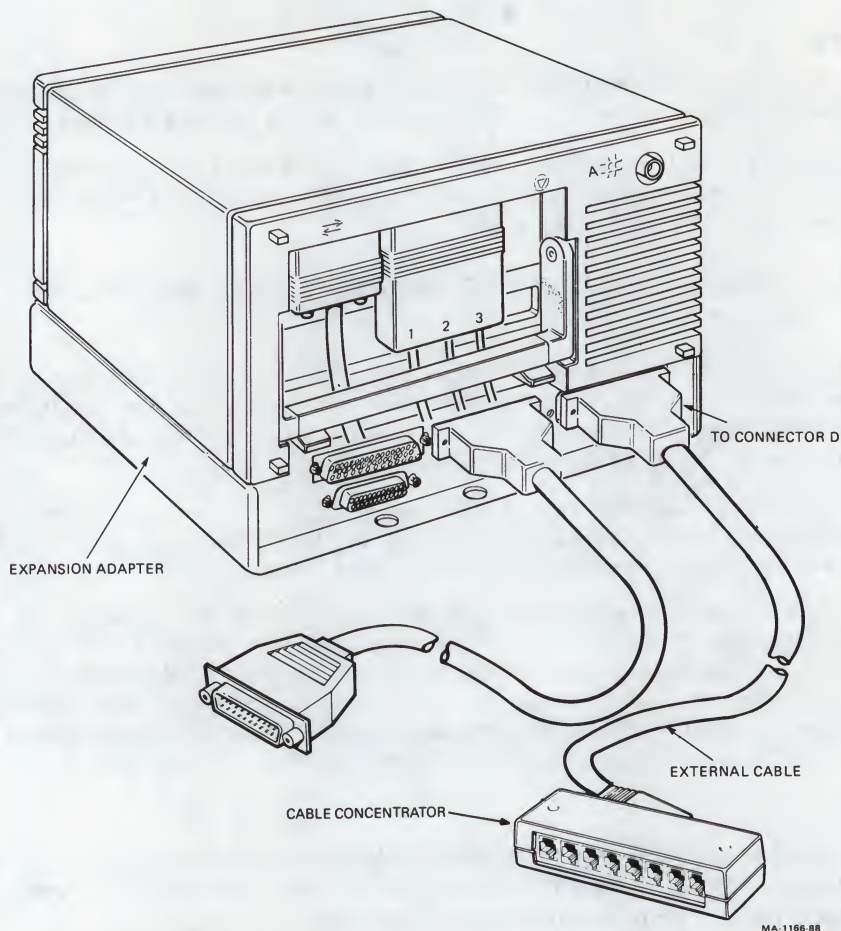
The DSH32 option consists of a controller module, internal cabling, and two driver/receiver modules with external cabling to connectors C and D on the rear of the system's expansion adapter. (See Figure 2-3.)

You can order a new system with this option already installed. If you want this option installed in a system already on your site, a qualified service representative must perform the installation of this option. The user can then connect the external cable, cable concentrator, and additional terminals. See the DSH32 addendum to your system installation guide for information about connecting the external cables to the DSH32 option.

**NOTE**

To install the DSH32 option in your system, you must have the BA40-BA expansion adapter. If your system does not have the BA40-BA expansion adapter, contact your Digital sales representative.





**Figure 2-3 DSH32 Serial Line Option**

#### 2.4.3.1 Powering up the system with the DSH32

To power up the MicroVAX 2000, first power up the console terminal (the one connected to connector 1 on the DEC423 converter on the back of the system unit). Then power up all peripheral devices, including the terminals connected to the cable concentrator. Finally, power up the system unit.

The console terminal displays the following:

```
KA410-A V2.2
```

```
F...E...D...C...B...A...9...8...7...6...5...4...3...2...1...
```

```
? C 0080 0000.4001
```

#### NOTE

The question mark and associated letters and numbers are a normal power-up indication in the MicroVAX 2000, and do not represent a failure.

Type **TEST 50** and press **Return** at the console prompt **>>>**. Your console terminal should display text similar to the following, depending on the configuration of your system.

**>>> TEST 50**

KA410-A V2.2

ID 08-00-2B-02-CF-A4

```

      CLK          0000.0001
      NVR          0000.0001
? DZ          0000.4001
      00004001 00000001 00000001 00000001 00000000 00000000
      MEM          0004.0001
      00400000
      MM          0000.0001
      FP          0000.0001
      IT          0000.0001
      HDC          1710.0001
      000146B8 00000000 00000320
      TPC          0000.4001
      FFFFFFF03 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05
      SYS          0000.0001
      DSH32-A      00FF.0001 V1.0
      DSH32-S      0000.0001 V1.0
      NI          0000.0001

```

**>>>**

#### **NOTE**

The question mark associated with the DZ mnemonic is a normal power-up indication in the MicroVAX 2000, and does not represent a failure.

If you see the double question mark displayed beside the mnemonic DSH32-A or DSH32-S, the DSH32 option is failing the test. See the troubleshooting section in this addendum and *MicroVAX 2000 Troubleshooting* to diagnose and to solve the problem.

### 2.4.3.2 Troubleshooting Problems

If the system exhibits problems after installation of the DSH32 option, or if failures appear during operation, run the tests described in this section. Check the connections between the 50-pin cable and connector C, and between the 36-pin cable with the cable concentrator and connector D. See the DSH32 addendum to *MicroVAX 2000 Installation* for information about connecting the external cables for the DSH32.

If your system continues to fail, call a service representative.

### 2.4.3.3 Self-Test

The DSH32 option has two parts: the synchronous subsystem (DSH32-S) and the asynchronous subsystem (DSH32-A). Run the self-test twice, once for each part of the DSH32 option.

#### 2.4.3.3.1 Synchronous (DSH32-S) Self Test

Type **TEST 3** at the console prompt **> > >**, and press **Return**. Your console terminal should display the following:

```
>>> TEST 3
      3...
>>>
```

If the DSH32 option is failing, you will see the following display:

```
>>> TEST 3
      3?..
      84 FAIL
>>>
```

If the system fails this test, there is a problem in the internal circuitry of the DSH32 option. Run **TEST 50**, and write down any error codes. Then call a service representative to have repairs made.



#### 2.4.3.3.2 Asynchronous (DSH32-A) Self Test

Type **TEST 4** at the console prompt **> > >**, and press **Return**. Your console terminal should display the following:

```
>>> TEST 4
```

```
4...
```

```
>>>
```

If the DSH32 option is failing, you will see the following display:

```
>>> TEST 4
```

```
4?..
```

```
84 FAIL
```

```
>>>
```

If the system fails this test, there is a problem in the internal circuitry of the DSH32 option. Run TEST 50, and write down any error codes. Then call a service representative to have repairs made.

### 2.4.3.4 System Exerciser

If you see no errors at power up, but there are problems in your system, run the system exerciser.

Type **TEST 0** and press **Return** at the console prompt **>>>**. Your console terminal should display the following:

```
KA410-A V2.2          01      CU
?? C  0080    DZ      0000.2020    6      0 00:05:01
   B  0010    MEM      00D7.0001    3      0 00:04:54
   7  0090    HDC      0000.0001    9      0 00:04:58
                        0700.0001
   6  00A0    TPC      8000.0001    3      0 00:04:55
   4  81F0    DSH32-A  00FF.0001    2      0 00:04:54
                        0001.0001
                        0001.0001
                        0001.0001
                        0001.0001
   3  81F1    DSH32-S  0001.0000    2      0 00:05:22
                        0000.0001
```

>>>

#### NOTE

The question marks associated with the DZ mnemonic is a normal indication in the MicroVAX 2000, and does not represent a failure.

If you see any question marks on the lines starting with 4 or 3, the serial line option is failing the test, and you must call a service representative.

If you experience a problem with one of the terminals connected to the cable concentrator, disconnect it and run the self-test on the system. If the system passes the test, you may have a bad terminal, cable concentrator, or external cable. Connect the terminal to another system to see if the terminal is failing. Swap the cable concentrator and cable, if possible, to see if they fail on another MicroVAX 2000.

If you are unable to resolve the problem, call your service representative. Be prepared to give your representative the results of any tests you may have run.

## 2.5 Printers

The MicroVAX 2000 can be used with the following printers: the LN03, LN03 PLUS, LN03R ScriptPrinter, the LPS40, the LA210, the LA50, the LA75, and the LA100. For information, about installing a printer for use with your system, see *MicroVAX 2000 Installation*.

### 2.5.1 The LN03

The LN03 laser printer (Figure 2-4) is a tabletop, nonimpact printer that produces letter-quality text at eight pages a minute. For systems running MicroVMS or VMS, the printer can also display graphics.

The LN03 printer offers 16 fonts, including Courier, Elite, and the VT100 Line-Drawing Set (the Digital standard set). ASCII multinational technical character sets and 12 national language character sets can also be used.

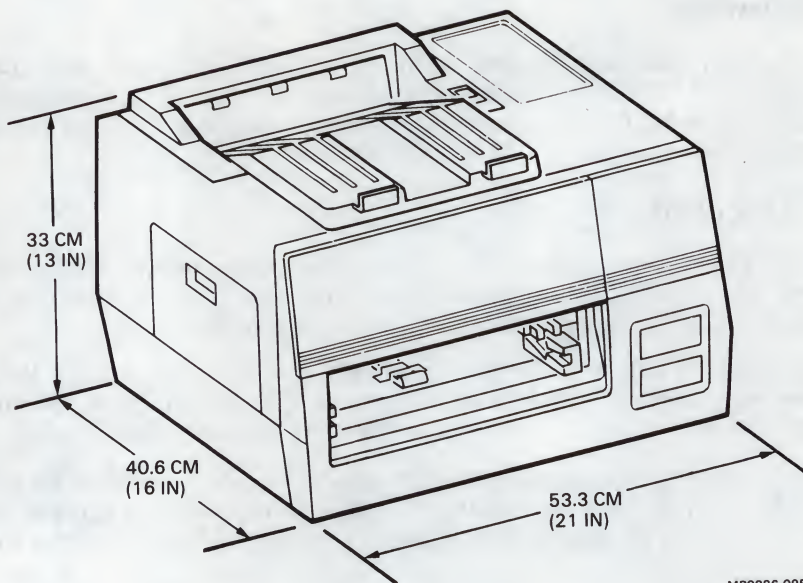
The printer comes with three character sets. The LN03 printer can print up to 24 fonts on a page. To expand memory or add additional fonts, you can purchase more programmable RAM or precoded ROM cartridges from Digital.

The LN03 printer uses only cut sheet paper. A paper cassette holds 250 sheets of paper. The printer automatically collates output for you in its face-down output tray. The LN03 printer can also handle preprinted single-part forms, transparencies, and labels. The LN03 printer can print in either landscape (horizontal) or portrait (vertical) mode.

The LN03 printer weighs 28 kilograms (66 pounds).

To order an LN03 printer after the initial system installation, contact your sales representative. You can install the LN03 printer yourself. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.





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MA-1102-88

**Figure 2-4 The LN03 Laser Printer**

### 2.5.2 The LN03 PLUS

The LN03 PLUS is the upgrade configuration of the LN03 laser printer. The LN03 PLUS system consists of a base LN03 laser printer and an LN03S bitmap option module. The LN03 PLUS requires the firmware microcode v4.4 to be installed in the base LN03 printer.

The LN03 PLUS enhances the ability of the LN03 printer to print documents composed of text and graphics. The LN03 PLUS enables you to process ANSI and Tektronix data files with any ratio of text to graphics and with no limits on image complexity.

The LN03S bitmap option module is a single printed circuit board inserted into the available option slot of the LN03 printer. This option module key feature is an on-board memory capacity of one Mbyte of dynamic RAM used for bitmap storage. The LN03S option module also contains up to 128 Kbytes of ROM for program and font storage.

The printer and host system communicate through the standard RS232-C serial interface.

All setup features in the LN03 PLUS are the same as in the base LN03 and are controlled through the default setting of configuration switches or under program control.

To order an LN03 PLUS printer, or an LN03S option module for installation into an existing LN03 printer, contact your sales representative. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.

### 2.5.3 The LN03R ScriptPrinter

The LN03R ScriptPrinter is a nonimpact page printer that uses laser recording technology to produce high-quality prints. Using the PostScript language, the ScriptPrinter can combine and print complex pages, including text, graphics, and sampled images.

The ScriptPrinter provides 750 dots per centimeter (300 dots per inch), both vertically and horizontally, and prints a maximum of eight pages per minute.

The printer and host system communicate through the standard RS232-D serial interface.

To order an LN03R ScriptPrinter after your initial system installation, contact your sales representative. You can install the LN03R ScriptPrinter yourself. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.

### 2.5.4 The PrintServer 40 (LPS40)

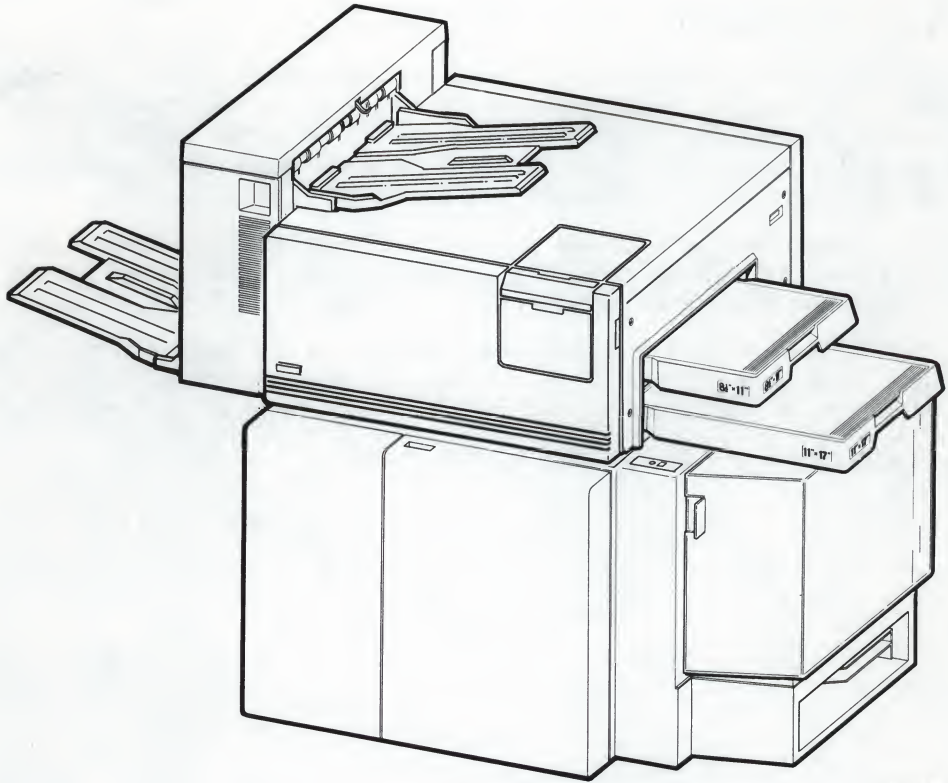
The PrintServer 40 (Figure 2-5) is a MicroVAX II-based laser printer containing PostScript software. The PrintServer 40 is designed as an Ethernet node in order to serve many users.

A dedicated MicroVAX II-based data controller interprets application programs that output in PostScript, a powerful industry-standard page description language. The PrintServer 40 supports existing software using ANSI text/sixels, ReGIS, or Tektronix 4010/4014 format through the use of host-based translators.

The PrintServer 40 prints monochromatically at a rate of 40 pages per minute at a resolution of 300 x 300 dots per inch. Paper sizes include letter, legal, and ledger, and A4, A5, B4 and B5 metric sizes. A large capacity input tray holds 2000 sheets of cut sheet paper and two auxiliary trays hold 250 sheets each.

The PrintServer 40 contains a library of 29 typefaces that may be scaled to any point size, rotated to any degree, and positioned anywhere on a page through the use of PostScript commands. The PrintServer 40 is 102.62 centimeters (40.4 inches) high, 72.14 centimeters (28.4 inches) deep, and 152.4 centimeters (60.0 inches) wide. The PrintServer 40 weighs 219.99 kilograms (484 pounds).





MA-1074-B6

**Figure 2-5 The PrintServer 40 (LPS40)**

To order a PrintServer 40 after the initial system installation, contact your sales representative. (Check with your sales representative on support of the PrintServer 40 with ULTRIX operating system software.)

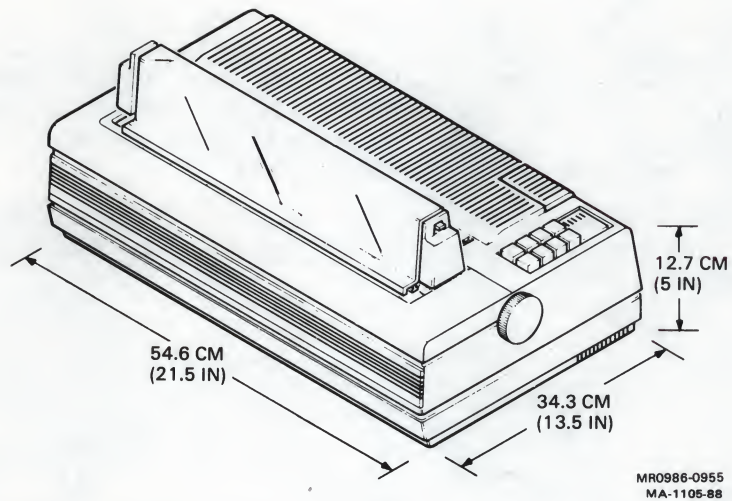
### **2.5.5 The LA210**

The LA210 (Figure 2-6) is a dot-matrix desktop printer that can produce high-speed drafts (240 characters per second) or near letter-quality correspondence (40 characters per second). With the addition of an optional font cartridge, the LA210 can print memo-quality correspondence (80 characters per second). The LA210 also prints bitmap graphics.

The printer can print in USASCII, 10 national languages in Courier 10, and the VT100 line-drawing set (the Digital standard set). Other features include three optional typefaces and 30 optional character sets.

The LA210 prints on single-sheet and fanfold paper and handles forms with up to four parts. The printer's carriage accommodates paper ranging in width from 8.9 centimeters (3.5 inches) to 37.8 centimeters (14.9 inches).

The printer weighs 11.3 kilograms (25 pounds).



**Figure 2-6 The LA210**

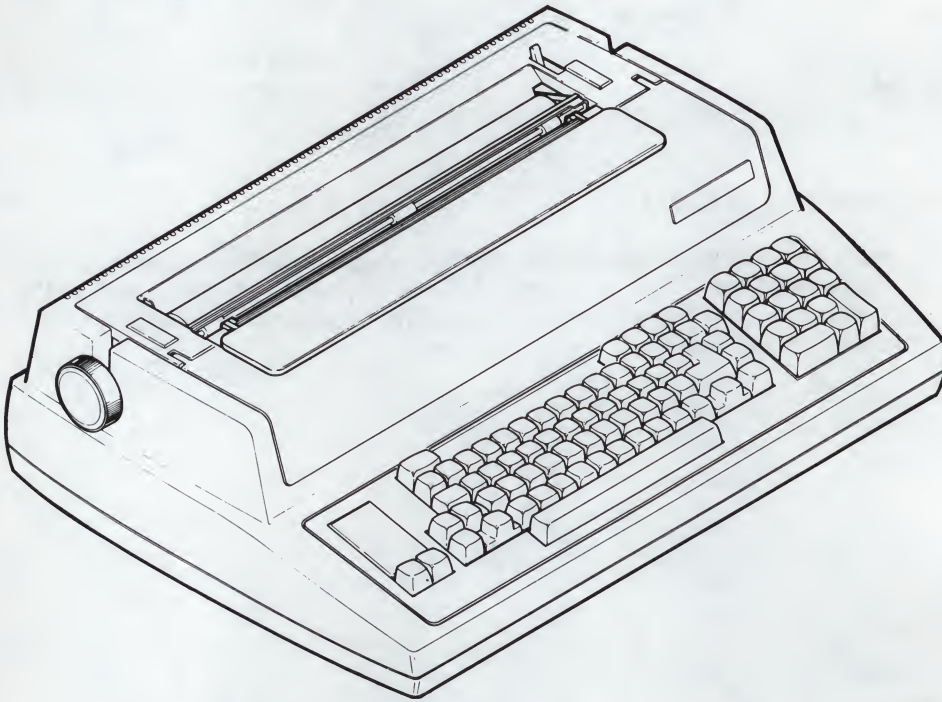
To order an LA210 printer after the initial system installation, contact your sales representative. You can install the LA210 printer yourself. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.



### 2.5.6 The LA100

The LA100 (Figure 2-7) is a dot-matrix desktop printer. The LA100 produces high-speed drafts (240 characters per second) or near letter-quality correspondence (40 characters per second). With the addition of an optional font cartridge, the LA100 prints memo-quality correspondence (80 characters per second). The LA100 produces text, graphics, and line-drawing at a rate of 40 to 132 characters per line.

The LA100 contains a 39 centimeter (15 inch) carriage that accommodates fanfold paper and forms in as many as four parts. The LA100 weighs 9.1 kilograms (20 pounds).



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MA-1108-88

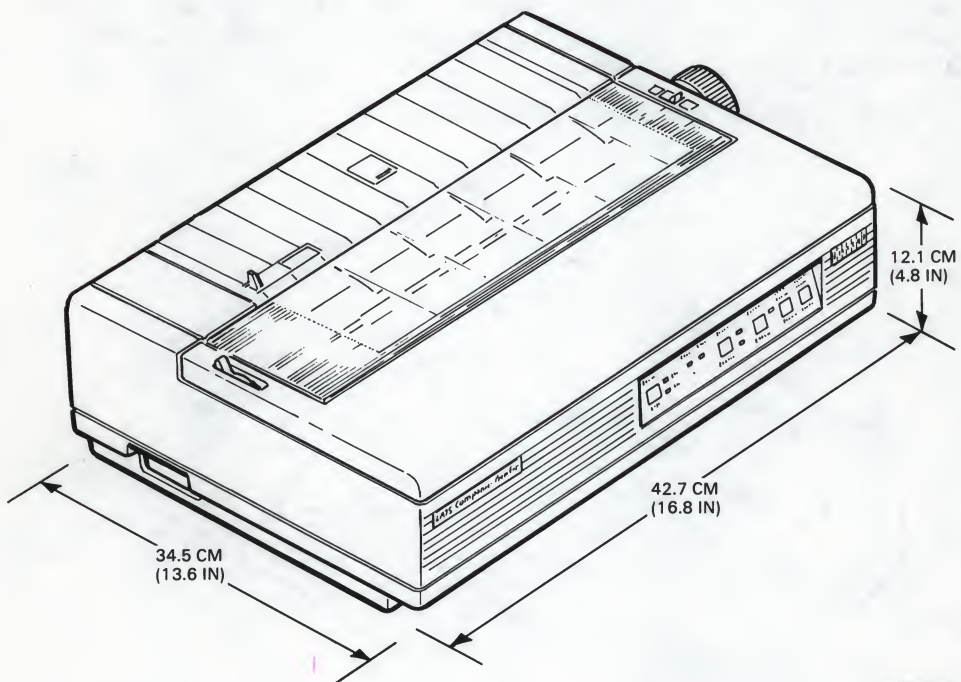
**Figure 2-7 The LA100**

To order an LA100 after the initial system installation, contact your sales representative. You can install an LA100 printer yourself. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.

### 2.5.7 The LA75

The LA75 (Figure 2-8) is a desktop dot-matrix printer that can produce sixel-protocol bitmap graphics. The LA75 prints in draft speed (250 characters per second), memo speed (125 characters per second), and letter quality speed (32 characters per second). The printer offers optional font cartridges and international character sets. You can use office stationery or fanfold paper.

The LA75 weighs 10.0 kg (22.0 pounds).



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MA-1115-88

**Figure 2-8 The LA75**

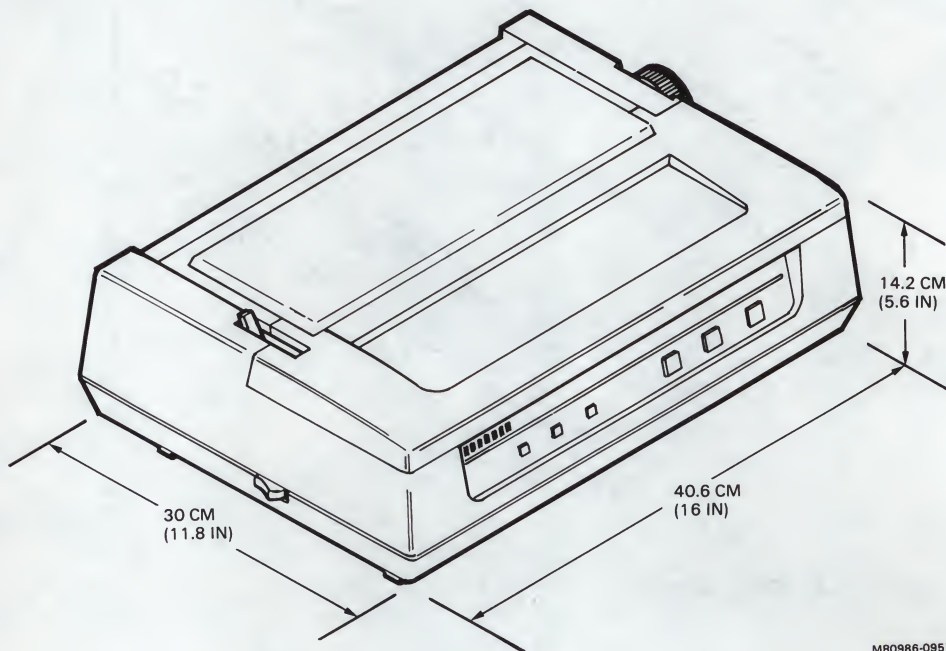
To order an LA75 printer after the initial system installation, contact your sales representative. You can install the LA75 printer yourself. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.

### 2.5.8 The LA50

The LA50 (Figure 2-9) is a desktop dot-matrix printer that produces bitmap or character cell graphics.

The LA50 prints in draft speed (100 characters per second) and memo speed (50 characters per second). The printer offers one font and six character widths. Ten national character sets are available. You can use office stationery or fanfold paper.

The LA50 weighs 8.5 kilograms (18.7 pounds).



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MA-1116-88

**Figure 2-9 The LA50**



To order an LA50 after the initial system installation, contact your sales representative. You can install an LA50 printer yourself. Follow the instructions in the printer installation guide, then see the *MicroVAX 2000 Installation* documentation.

## 2.6 Terminals

The following terminals are available for use with the MicroVAX 2000:

Terminal	Description
LA100	Tabletop hardcopy (printing) terminal
LA120	Floorstand hardcopy terminal
VT220	Desktop video terminal
VT240	Desktop video graphics terminal
VT241	Desktop color video graphics terminal
VT320	Text video terminal
VT330	Text/graphics video terminal
VT340	Color text/graphics video terminal

### 2.6.1 The LA100 and LA120 Hardcopy Terminals

The LA100 is a serial dot-matrix send/receive printer. The LA100 is a tabletop model and offers multiple print modes and character sets. The LA120 is a serial, dot-matrix, floorstand send/receive printer. The LA120 offers full and half-duplex modem support, selectable baud rates, and optional character sets.

### 2.6.2 The VT200-Series Video Terminals

The VT200-series terminals consist of separate video monitors and keyboards. Each contains set-up menus in three languages that allow the user to control display characteristics. Local hardcopy can be output to a printer. Keyboards are available in many languages. Both 7- and 8-bit character support is offered.

The VT220 is a monochromatic text terminal with three phosphor display colors available.

The VT240 is a monochromatic text and graphics terminal with three phosphor display colors available.

The VT241 is a text and graphics terminal that uses a red-green-blue color monitor.

### 2.6.3 The VT300-Series Video Terminals

The VT300-series feature a single DEC423 MMJ serial communications port for easy connection to office systems that use DECconnect. Each terminal consists of a separate video monitor and keyboard. Each contains setup menus in three languages that allow the user to control display characteristics. Local hardcopy can be output to a printer. Keyboards are available in many languages. Both 7- and 8-bit character support is offered.

The VT320 is a monochromatic text terminal with three phosphor display colors available.

The VT330 and VT340 offer dual session capability. The VT330 is a monochromatic text and graphics terminal with three phosphor display colors available.

The VT340 is a text and graphics terminal that uses a red-green-blue color monitor. The VT340 color editor allows you to mix and match up to 16 colors from a palette of 4096 on the screen.

## 2.7 Modems

Three modems are available for use with the MicroVAX 2000:

Modem	Description
DF224	300, 1200 and 2400 bits per second (bits/s) full-duplex synchronous/asynchronous
DF124	1200 and 2400 bits/s full-duplex synchronous/asynchronous
DF112	300 and 1200 bits/s full-duplex synchronous/asynchronous

### 2.7.1 DF224

The DF224 modem provides full-duplex communication at speeds of 300, 1200, and 2400 bits/s (asynchronous) and 1200 and 2400 bits/s (synchronous). The DF224 allows both rotary and pushbutton dialing over dial-up or leased-line networks.

The DF224 contains an autodialer with memory and provides autoanswer capability in addition to manual operation. A data/talk switch and automatic adaptive equalizer are also provided. The DF224 diagnostics test the modem at each power-up.

### **2.7.2 DF124**

The DF124 modem provides full-duplex communication at speeds of 1200 and 2400 bits/s (asynchronous and synchronous) over dial-up or leased line networks. The DF124 contains an autodialer with memory, a data/talk switch and diagnostic self-tests.

### **2.7.3 DF112**

The DF112 modem communicates at 300 and 1200 bits/s full-duplex (asynchronous and synchronous) over dial-up or leased line networks. An autodialer with memory and data/talk switch are provided. The DF112 is compatible with both rotary and pushbutton dialing.

To order a modem after initial system installation, contact your sales representative. To install a modem, see the *MicroVAX 2000 Installation*.



# A

## Related Documents

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### NOTE

For option and system hardware part numbers, contact your sales representative.

Not all of the following documents are available in every country. Check with your sales representative for availability.

### A.0.1 Hardware Manuals and Kits

- MicroVAX 2000 Hardware Information Kit (EK-ZNAAG-GZ))
- VAXstation 2000, MicroVAX 2000, and VAXmate Network Guide (EK-NETAA-UG)
- VAXstation 2000/MicroVAX 2000 Maintenance Guide (EK-VSTAB-MG)

### A.0.2 Software Manuals

#### A.0.2.1 MicroVMS and VAX/VMS

- Installing MicroVMS on a VAXstation 2000/MicroVAX 2000 (AA-JE60A-TN)
- VMS Installation and Operations: VAXstation 2000, MicroVAX 2000 (AA-LB3YA-TE)
- VAXstation 2000/MicroVAX 2000 Operations Guide (AA-JE59A-TN)
- MicroVMS User's Manual (AA-Z209D-TE)
- VAX/VMS User's Manual (AI-Y517A-TE)

#### **A.0.2.2 ULTRIX-32**

- ULTRIX-32 Basic Installation Guide for the MicroVAX 2000 (AA-KU45A-TE)
- ULTRIX-32 Network Management Guide (AA-JD76A-TE)
- ULTRIX-32 Programmer's Manual (AA-BG53D-TE, AA-BG54D-TE, and AA-BG56D-TE)
- ULTRIX-32 System Management Guide (AA-BG59B-TE)

#### **A.0.3 Options Manuals**

- VT220 Installation Guide (Order No. EK-VT220-IN)
- VT220 Owner's Manual (Order No. EK-VT220-UG)
- VT220 Programmer's Reference Manual (Order No. EK-VT220-RM)
- VT240 Series Installation Guide (Order No. EK-VT240-IN)
- VT240 Series Owner's Manual (Order No. EK-VT240-UG)
- VT240 Series Programmer's Reference Manual (Order No. EK-VT240-RM)
- VT240 Series Technical Manual (Order No. EK-VT240-TM)
- Installing and Using the VT320 (Order No. EK-VT320-UG)
- VT320 Programmer's Reference Manual (Order No. EK-VT320-RM)
- Installing and Using the VT330 (Order No. EK-VT330-UG)
- VT330 Programmer's Reference Manual (Order No. EK-VT330-RM)
- Installing and Using the VT340 (Order No. EK-VT340-UG)
- VT340 Programmer's Reference Manual (Order No. EK-VT340-RM)
- Installing and Using the LN03 (Order No. EK-0LN03-UG)
- LN03 Programmer Reference Manual (Order No. EK-0LN03-RM)
- LN03 Maintenance Kit Guide (Order No. EK-LN03U-MG)
- LN03 Toner Kit Guide (Order No. EK-0LN03-MG)
- LN03 PLUS User Guide (Order No. EK-LN03S-UG)
- LN03 PLUS Programmer Reference Manual (Order No. EK-LN03S-RM)

- LN03S Bitmap Option Installation Guide (Order No. EK-LN03S-IG)
- PrintServer 40 Operator's Guide (Order No. EK-LPS40-OP)
- PostScript Language Tutorial and Cookbook (Order No. AA-HL86A-TE)
- Installing the LA210 Letterprinter (Order No. EK-LA210-IN)
- LA210 Letterprinter User Guide (Order No. EK-LA210-UG)
- LA210 Letterprinter Programmer Reference Manual (Order No. EK-LA210-RM)
- LA210 Letterprinter Operator and Programmer Reference Guide (Order No. EK-LA210-RC)
- LA210 Letterprinter Emulation Modes Reference Guide (Order No. EK-LA210-RG)
- LA100 Letterwriter User Documentation Kit (Order No. EK-LW100-UG)
- Installing and Using the LA75 Companion Printer (Order No. EK-OLA75-UG)
- LA75 Companion Printer Programmer Reference Manual (Order No. EK-OLA75-RM)
- LA75 Companion Printer Programmer Reference Card (Order No. EK-OLA75-RC)
- LA75/LA75P Technical Manual (Order No. EK-OLA75-TM)
- Installing and Using the LA50 Printer (Order No. EK-OLA50-UG)
- LA50 Printer Programmer Reference Manual (Order No. EK-OLA50-RM)
- The RX33 Diskette Drive Technical Description (Order No. EK-RX33T-TM)
- RD53 Fixed-Disk Drive Technical Description (Order No. EK-RD53A-TD)
- RD54 Fixed-Disk Drive Technical Description (Order No. EK-ORD54-TD)
- TK50 Tape Drive Subsystem Owner's Manual (Order No. EK-LEP05-OM)
- TK50 User's Guide (Order No. EK-OTK50-UG-004)
- TK50 Technical Manual (Order No. EK-OTK50-TM)



# Glossary

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**Application program**

A program that performs an end-user task, such as a financial spreadsheet program.

**ASCII**

American Standard Code for Information Interchange. A set of 7- or 8-bit binary numbers representing the alphabet, punctuation, numerals, and other special symbols used in text representation and communications protocol.

**Backup process**

The process of making copies of the data stored on your disk so that you can recover that data after an accidental loss. You make backup copies on RX33 diskettes, TK50 tape cartridges, or over a network.

**Backup copy**

A copy of data stored on your disk. The duplicate copy is stored on either RX33 diskettes or TK50 tape cartridges.

**Baud rate**

The speed at which signals are serially transmitted along a communications line. One baud equals one bit per second.

**Binary**

A number system that uses two digits: 0 and 1. They are represented in system circuitry by two voltage levels, and programs are executed in binary form.

**Bit**

A binary digit; the smallest unit of information in a binary system of notation, designated as a 0 or a 1.

**BNC connector**

The connector on the rear of the MicroVAX 2000 system unit to which the ThinWire Ethernet cable is attached.

**Boot**

See **Bootstrap**.

**Bootable medium**

A fixed-disk, diskette, or magnetic tape containing software (such as operating system software) that a bootstrap program can load into the system memory and execute.

**Boot device**

A device in the system, such as a -disk drive, that can be used to store bootable software.

**Bootstrap, (or boot)**

Verb - To execute the bootstrap loader program. The bootstrap loader loads the operating system software from a mass storage device and executes it.

Noun - A bootstrap program.

**Byte**

A group of eight binary digits (bits). A byte is one-quarter of a VAX system word.

**Central processing unit (CPU)**

The part of the system that controls the interpretation and execution of instructions. In the MicroVAX 2000 system, CPU functions are contained on one MicroVAX II CPU chip.

**Cluster**

A group of computers networked together.

**Communications line**

A cable along which electrical signals are transmitted. Devices or systems that are connected by a communications line can share information and resources.)

**Computer system**

A combination of system hardware, software, and external devices that performs operations and tasks.

**Console mode**

The state in which the computer is controlled from the console terminal. The MicroVAX 2000 can be put in console mode by pressing the halt button on the rear of the MicroVAX system unit. Console mode is indicated by the console prompt > > > on the monitor or console terminal screen. The other mode the system can operate in is program mode. (See **Program mode**).

**Console terminal**

The terminal connected to port 1 on the rear of the MicroVAX 2000 system unit. This terminal is used to enter console commands and perform other system functions.

**Controller**

A system component, usually a printed circuit board, that regulates the operation of one or more peripheral devices.

**Converter**

A small device attached to the back of the MicroVAX 2000 system unit that converts RS232 protocol signals to DEC423 protocol signals.

**CPU**

Abbreviation for central processing unit. (See **Central processing unit**).

**CRT (Cathode ray tube)**

A vacuum tube that generates and guides electrons onto a fluorescent screen to produce characters or graphics. This term is often used to refer to a monitor.

**Data**

A formal representation of information suitable for communication, interpretation, and processing by humans or computers.

**Data transmission**

The movement of data in the form of electrical signals along a communications line.

**Debug**

To detect, locate, and correct errors (bugs) in hardware or software.

**Device**

The general name for any unit connected to the system that is capable of receiving, storing, or transmitting data. (See **Input device**, **Output device**, **Input/output device**, and **Controller**).



**Device name**

The name by which a device or controller is identified in the system. Use that name to refer to that device when you are communicating with the system.

**Diagnostics**

Programs that detect and identify abnormal system hardware operation. The diagnostic programs for the MicroVAX 2000 system are located in read-only memory. (See **Read-only memory**).

**Disk**

A flat circular plate with a coating on which data is magnetically stored in concentric circles (tracks). A fixed-disk resides permanently inside a disk drive, while a diskette is removable.

**Disk drive**

A device that holds a disk. The drive contains mechanical components that spin the disk and move the read/write heads that store and read information on the surface of the disk.

**Diskette**

A flexible, "floppy" disk contained in a square jacket. Diskettes can be inserted and removed from diskette drives.

**Diskette drive**

A disk drive that only reads or writes on removable diskettes.

**Dot matrix**

A method of generating characters for printing that uses dots to produce readable characters.

**Down-line load**

See **remote install**.

**Error message**

A message displayed by a system to indicate a mistake or malfunction.

**Ethernet**

A type of local area network based on Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

**File**

A collection of related information treated by the system as a single unit.

**Fixed-disk**

See **Disk**.

**Formatted data**

Data that is structured in a particular pattern to be understood by the system software.

**Hardcopy terminal**

A terminal that displays information on paper. Compare to **video terminal**.)

**Hardware**

The physical components—mechanical and electrical— that make up a system. Compare to **software**.)

**Head**

The part of a fixed-disk drive, diskette drive, or tape drive that reads, records, and erases data. Also called read/write head.

**Host**

The primary or controlling computer in a multiple computer network.

**Icon**

A graphic symbol that gives a visual image of a device or a procedure's function. Icons often appear on the system's enclosure to aid the user in locating connectors and controls.

On a workstation, a graphic symbol displayed on a monitor or terminal screen, which represents a window or action. A window may be shrunk to an icon.

**Input/Output (I/O) device**

A piece of equipment that accepts data for transmission to (input) and from (output) the system. For example, a terminal.

**Interactive**

A method of communicating with the system. In an interactive session, you type a command at the keyboard and the system executes the command and responds with a prompt character for another command.

**Interface**

A device or piece of software that allows the components of the system to communicate with each other.

**I/O**

Abbreviation for input/output. (See **Input/output (I/O) device**).

**K**

The symbol that means 2 to the 10th power (or 1024 in decimal notation). Also an abbreviation for kilo (thousand).

**Kilobyte**

1024 bytes. Often abbreviated as Kbytes.

**Load**

To copy software (usually from a peripheral device) to memory.

To physically place a disk in a disk drive or a tape in a tape drive.

**Local area network (LAN)**

A data communications system designed for a small geographic area that offers high-speed communications channels optimized for connecting information processing equipment. For example, ThinWire Ethernet.

**M**

The symbol for 1024 squared (1,048,576 in decimal notation). Also an abbreviation for mega (million).

**Magnetic tape**

A tape used for storing data that is made of plastic and coated with magnetic oxide. Also called magtape.

**Megabyte**

1,048,576 bytes. Often abbreviated as Mbyte.

**Memory**

The area of the system that electrically stores instructions and data, often temporarily.

**Memory module**

A printed circuit board that contains additional memory for the system.

**Module**

A printed circuit board that contains electrical components and electrically conductive pathways between components. A module stores data or memory or controls the functions of a device. (See **Printed circuit board**).



**MicroVMS**

The VAX/VMS operating system software. This operating system is specifically designed for MicroVAX-based systems.

**Network**

A group of individual computer systems that are connected by communications lines to share information and resources.

**Node**

An individual information-processing unit, such as a computer, workstation, or peripheral device, that is connected to a network.

**Off-line**

Pertaining to equipment, devices, and events that are not controlled by the system, or have been logically disconnected from the system.

**On-line**

Pertaining to equipment, devices, and events that communicate with the system.

**Operating system**

A collection of system programs that control the operation of the system and allow the user access to data files, input/output devices, and applications programs. The operating system software performs such tasks as assigning memory to programs and data, processing requests, and scheduling jobs. MicroVMS and ULTRIX are the two operating systems offered for the MicroVAX 2000.

**Output device**

A device that accepts data from the system. A printer is an example of an output device.

**Peripheral device**

A device that provides the CPU with additional memory storage or communication capability. Examples are disk and diskette drives, video terminals, and printers.

**Port**

The name of the socket or connector at the back of the computer to which a terminal, printer, or other communication devices are connected.

**Power-up sequence (power up)**

A series of ordered events that occur when you supply power by turning on the system.

**Printed circuit board**

A piece of fiberglass board used to make modules. (See **module**).

**Printer**

A peripheral device that provides paper copies of information stored on the system.

**Program**

The sequence of instructions the system uses to perform a task. (See **Software**).

**Program mode**

The state in which the computer is controlled by the operating system. After the operating system is installed, the system will always operate in program mode, unless you put it into console mode. (See **Console mode**).

**Prompt**

Words or characters that the system displays to indicate that it is waiting for you to type a command.

**RAM**

Abbreviation for random-access memory. (See **Random-access memory (RAM)** .)

**Random-access memory (RAM)**

Memory that can be both read and written into and randomly access any one location during normal operations. The type of memory the system uses to store the instructions of programs currently being run.

**Read-only memory (ROM)**

A memory whose contents cannot be modified. The system can use the data contained in a ROM, but cannot change it.

**Remote install**

To send a copy of a system image or other file over a line to the memory of a target node.

**ROM**

Abbreviation for read-only memory. (See **Read-only memory (ROM)** .)

**Run**

Noun - A single continuous execution of a program.

Verb - To execute a program.

**Software**

Programs executed by the system to perform a chosen or required function. (Compare to **software**.)

**Storage medium**

Any device capable of recording information; for example, a diskette.

**Store**

To enter data into a storage device, such as a disk, or into memory.

**System**

A combination of system hardware, software, and peripheral devices that performs specific processing operations.

**System image**

The image that is read into memory from disk when the system is started up (booted).

**System management tasks**

Tasks performed by an assigned person to operate and maintain the system. That person is usually the system manager.

**Tape drive**

A device that contains mechanical components and holds, turns, reads, and writes on magnetic tape.

**T-connector**

A connector used in ThinWire Ethernet. One part of the connector attaches directly to a station such as the MicroVAX 2000. The other two parts connect to ThinWire Ethernet cable.

**Terminal**

An input/output device that allows you to communicate with the system. Terminals are divided into two categories: video and hardcopy.

**Terminator**

A special connector used on one or both ends of an Ethernet segment that provides the 50-ohm termination resistance needed for the cable.

**Text cursor**

A block or line, usually blinking, displayed on a CRT screen to indicate where the next character typed will appear.



**ThinWire**

A Digital trademark used to describe its 10base2 (IEEE standard 802.3 compliant) Ethernet products used for local distribution of data.

**32-bit length**

The length of the internal data path of the CPU. This length provides more concentrated data, allows more data types, and enables more data to be transferred at one time than a 16-bit internal data path.

**ULTRIX-32**

An interactive, time-sharing operating system derived from UNIX and enhanced by Digital to work with MicroVAX hardware and software.

**User input device**

A piece of equipment that is used to transfer data to the system. For example, keyboard, disk, tape, and system are input devices.

**User command**

An order you give to the system through a keyboard, mouse, or other input device.

**Video terminal**

A terminal that displays information on the screen of a cathode ray tube (CRT). Compare to **hard-copy terminal**.)

**VLSI**

Very large scale integration of integrated circuit chips. A large number of chips can fit on a printed circuit board; therefore, fewer boards are needed, and the system can be smaller.

**VT200-series terminals**

A family of video terminals offered by Digital. The VT200-series includes the VT220, VT240, and VT241 terminals.

**Winchester disk**

A hard disk permanently sealed in a drive unit to prevent contaminants from affecting the read/write head. The sealed head/disk assembly (HDA) helps to increase drive reliability and ensure data integrity. (See **Fixed disk**.)

**Word**

The largest number of bits (32) that the MicroVAX 2000 system can handle in an operation. The system can also handle longwords (that is, two words or 64 bits).

**Write-protect**

To protect a disk, diskette, or other storage medium from the addition, revision, or deletion of information.

**Write-protect notch**

The small notch on the side of an RX33K or RX50K diskette that you can cover with an adhesive-backed foil label or tab to prevent loss of data by accidental overwriting.

**Write-protect switch**

The switch that you slide down on a TK50 tape cartridge to prevent loss of data by accidental overwriting.





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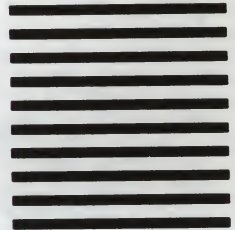
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